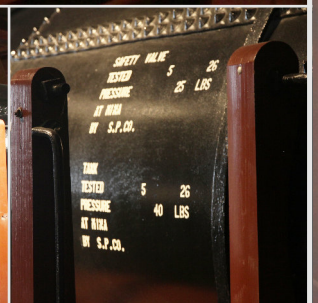
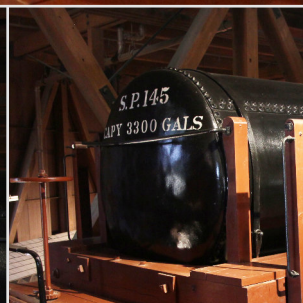
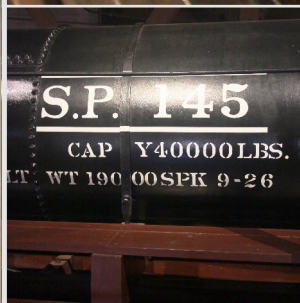


Southern Pacific #145

TANK CAR

Research and Restoration Report



10/89

THE SOUTHERN PACIFIC RAILROAD

NARROW GAUGE TANK CAR

NO. 145

REPORT ON RESTORATION AND RESEARCH

by

THE RESTORATION RESEARCH STAFF

CALIFORNIA STATE RAILROAD MUSEUM

Department of Parks and Recreation

January 8, 1979

PREFACE

It is the role of the research staff at the California State Railroad Museum to provide the information necessary for the valid and authentic restoration of equipment in the museum's collection. This task entails investigating and documenting the history of each piece and determining its operational appearance with as high a degree of accuracy as possible. It forms an indispensable part of the most detailed and comprehensive program of railroad restoration now being undertaken in the western United States.

The report that follows is one product of that research effort. Its purpose is to describe the work that was done, why it was performed in that way, and the results that were achieved. The report, however, is important not only as an account of research techniques and findings, but also as a record of the experience gained and possibilities explored in the course of the research and restoration process.

Clearly, this record is valuable for both the immediate and future projects of the museum. We hope that it will be useful, as well, to those engaged in similar endeavors elsewhere.

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HISTORICAL ANALYSIS AND RESEARCH METHODOLOGY

INTRODUCTION

Narrow gauge tank car No. 145, now in the collection of the California State Railroad Museum, is the only car of its type remaining from the Southern Pacific's desert branch which ran from Mound House, Nevada, to Keeler, California. When the museum's History Building opens in Old Sacramento, the car will play a prominent role in the presentation of Western railroading.

No. 145 was given to the Pacific Coast Chapter of the Railway and Locomotive Historical Society, Inc. in 1960 by the Southern Pacific when it abandoned its narrow gauge line. The RLHS, dedicated to the preservation of historic railroad equipment, presented S.P. No. 145 to the State of California in 1969 for restoration and display in the California State Railroad Museum.

After spending nearly 20 years in storage, S.P. No. 145 was trucked to the museum's restoration facility in Sacramento in February, 1977. During a two-month period, an intensive program of research and evaluation was carried out on the car and provided the necessary background for an authentic and faithful restoration. Much of the wood frame of the car was replaced, and the final restoration reflects the car's 1926 appearance.

The greatest single resource available for examination in this project was the car itself. Consequently, much of our efforts were expended on physical, archeological research on the car. This report -- the first one produced by

the research staff -- is a presentation of the information derived largely from that physical work. As a result of that painstaking and thorough investigation, the California State Railroad Museum has the most comprehensively researched and accurately restored narrow gauge tank car in any railroad collection.

HISTORICAL SUMMARY

In December 1892, the 13-year-old South Pacific Coast Railroad put into service three-foot gauge flat car No. 631. Built ^{by CP Santa Shop} at a cost of \$600, the 40,000 pound capacity car was equipped with hand brakes and link couplers, and, like most rolling stock of the period, lacked safety devices. It operated in general freight service on the S.P.C.'s line between Oakland and Santa Cruz through the southern coastal redwood belt. After ten years of service, the car was upgraded with knuckle couplers, Westinghouse air brakes, and safety appliances as required by law.

The first decade of the twentieth century was a time of growth and change for the South Pacific Coast Railroad. Controlled by the Southern Pacific, the narrow gauge S.P.C. experienced an increased demand for the movement of petroleum products for heating, industrial use, and locomotive fuel, and responded by converting a number of its flat cars into oil tank cars. Flat car No. 631 was modified for this purpose about 1904 with the addition of tank saddles and a 3,265-gallon steel tank. This major modification to the flat car resulted in a new light weight of 18,900 pounds, while its capacity remained unchanged at 40,000 pounds. As tank car No. 631, it carried oil for the South Pacific Coast, but changing conditions fated the oil car to a short life on that railroad.

Although the South Pacific Coast Railroad prospered with the increased traffic during this period, its parent company, the Southern Pacific, nevertheless decided to change the S.P.C.'s trackage from 3-foot to standard gauge. As

part of this plan, S.P. began transferring the South Pacific Coast rolling stock to its eastern California subsidiary, the Nevada and California Railway. [This narrow gauge line, composed of former Carson and Colorado trackage, ran from Mound House, Nevada, to Keeler, California in the Owens Valley. Tank car No. 631 was sent to the Nevada and California about 1906, although the S.P.C. retained ownership of the car. After three years of service on the desert line over Montgomery Pass, S.P.C. No. 631 was officially sold to the Nevada and California Railway for \$290 and renumbered N. & C. oil tank car No. 145. The N. & C. experienced several corporate changes over the next few years and in 1912 the Central Pacific took control. The tank car then became C.P. No. 145. As the Central Pacific was slowly absorbed by lease and purchase into the S.P., the lettering on the narrow gauge rolling stock reflected this change. In 1927, ownership of the Keeler line and all its equipment was transferred to the Southern Pacific, but for several years prior to this C.P. No. 145 had already been lettered S.P. No. 145.]

As with any piece of railroad rolling stock, general wear, accident damage, and changes in safety appliance regulations required S.P. No. 145 to be repaired and modified many times during its service life on the Southern Pacific. The South Pacific Coast had equipped the car with new couplers, air brakes, and hand grabs, and the improved brake beams, changed brake rigging and railings, and replacement frame components added by the S.P. further altered the No. 145 from its 1892 as-built appearance. Moreover, the car operated through an area of radical climatic variations, and general deterioration caused by winter snows and summer heat added to the car's maintenance needs. Work was generally performed by the narrow gauge line's shop crews, but the

car would occasionally be placed aboard a standard gauge car and sent to Sparks and, after 1939, Bakersfield, for heavy maintenance.

(1947)
Following World War II, the tank car was again renumbered and was operated as Southern Pacific narrow gauge tank car No. 352 on the remaining 71 miles of narrow gauge track between Keeler and Laws, California. No. 352 was one of four similar cars owned by the Southern Pacific in 1951 and was in service at the end of narrow gauge operation in April, 1960.

During June 1960, tank car No. 352 was presented by the Southern Pacific to the Pacific Coast Chapter, Railway and Locomotive Historical Society, Inc. for preservation, and was later moved from the Owens Valley to the Western Pacific Railroad Sand House at West Oakland, California for storage. In September 1964, the car was relocated to the former Key System Inspection Barn in Oakland.

In August 1969, the Pacific Coast Chapter presented several pieces of historic railroad equipment, including the No. 352, to the State of California for eventual restoration and display. On February 24, 1977, No. 352 was moved from Oakland to the State's railroad restoration facility at the Southern Pacific's Sacramento General Shops. There the tank car has been accurately restored to its 1926 appearance as Southern Pacific narrow gauge tank car No. 145, and will eventually be displayed in the History Building, California State Railroad Museum, Old Sacramento State Historic Park, Sacramento, California.

CONDITION UPON RECEIPT (see photo No. 2)

When S.P. No. 145 (No. 352) arrived at the Unit Shop in the Southern Pacific yards on February 24, 1977, the following preliminary observations were recorded:

The car is sitting on its trucks and is complete except for two disassembled brake rods which are with the car and the following missing parts:

- 8 brake shoes
- 1 queen post
- 9 truss rod bearings
- 1 retaining valve and piping
- 1 running board bracket

Wood parts generally are cracked and split, badly weathered on the exposed surfaces, and deteriorated at joints due to moisture and age. It is estimated that 95% of wood parts will need replacement.

60% of the interior truck springs appear to be broken, and must be replaced. The wheel sets are in good condition. Several grab irons and stirrups are bent and will be straightened, as will the side handrails. One stake pocket is broken and is to be brazed. With the exception of miscellaneous nails and screws, most of the hardware is in good reusable condition.

There are no dents, visible modifications, or repairs on the tank. It is of riveted construction, composed of five rolled courses with 100% crown radius dished and flanged heads. There is a dome riveted to course No. 3 (center of tank) with a side-mounted pressure relief valve. The dome and course No. 3 have a considerable buildup of crude oil from spillage. The remaining courses have large rusted areas and paint deterioration. There is a small quantity of oil remaining inside the tank.

The frame of the car is boxcar red, the tank black, and the dome is white. One truck is black and the other, seemingly a later rebuild, is boxcar red. All colors are faded and badly weathered.

PHYSICAL RESEARCH METHODOLOGY

S. P. No. 145 had been out of service for 17 years when it was trucked to the CSRM restoration facility. In order to determine its operational appearance with as much accuracy as possible, a program of exhaustive physical research was carried out on the car. Information evident when the car arrived was explored first. Lettering and numbering were visible through the surface paint on several areas of the tank and car frame. Because of the poor condition of the paint, the best technique to expose and highlight the lettering was found to be the use of a sharp-bladed knife to scrape carefully through the layers of paint. After the visible markings were exposed and noted, work was performed on those areas where no markings were visible. In these cases, preliminary heavy scraping and sanding was used to expose underlying layers. If traces of markings were found, careful scraping was pursued to completely expose the

information. In several cases, large amounts of information were found in apparently blank areas.

For working on metallic surfaces, X-acto type knives with curved blades (No. 22) proved to be the most effective tools. Very fine sandpaper was helpful in highlighting the subject area. It was found in some cases that after all scraping was completed, light sandblasting was useful as a final means for exposing data. Indeed, several important pieces of information (e.g., tank order information, "CENTRAL PACIFIC") were uncovered with this method.

Because of the nature of the surface (pitted, rusty, and flaky metal), paint remover was not suitable for use on the tank itself. Lacquer thinner was used as a cleaning agent for exposed lettering but, in many cases, especially where remaining paint was thin and faint, solvent deteriorated what paint remained. Water and soaps were also used, with less destructive results.

As each layer of new information was uncovered, it was documented in several ways. First, photographs were taken. When the evidence was so faint that it would not photograph well, the outline of the letter or number was carefully chalked for better resolution and then photographed. This outline was then traced on velum for a permanent record. Because numerous layers of markings were found on all surfaces of the car, it was imperative to accurately record the information immediately for later reference.

Photography -

Photographs were taken of S.P. narrow gauge tank car No. 145 for three basic reasons:

- 1) To support and justify the research decisions on the paint and lettering of the car as an adjunct to the efforts of the research group.
- 2) To aid in the restoration of the car by documenting the condition, construction, and configuration of the car and its components.
- 3) To record the restoration process itself.

The nature of these photographs and the methods used to secure them are outlined below.

First, all markings on the car when received and lettering found during our inquiry were photographed. As lettering emerged during scraping or sandblasting, photographs were made in black and white and color. This provides us with a graphic record of how the car was painted, how these markings were uncovered, and how they relate to one another. When combined with the tracings, measurements, and observations made on the car, we have a complete body of documentary evidence to support our conclusions about car finish.

Second, when the car was first photographed there was an effort made to take pictures of the car as a whole to provide for orientation of later, more detailed pictures. These "general arrangement" photographs show the car the way it was when it arrived, and depict the physical relationships of the major components of the car. The car was then photographed in sections, broadside, to show in somewhat greater detail how the parts go together. Detail photos, taken as required, record specific information about the car, such as arrangement of brake gear, condition of frame members, location of holes, types of assemblies, etc. These documents not only show how the car appeared prior to restoration, but also how it must be reassembled.

Third, as the car underwent restoration, pictures were taken to chronicle how it was being performed. These photographs are of value as they record the methods and processes used by the restoration workers at the California State Railroad Museum restoration facility.

PHYSICAL RESEARCH

TRUCKS - PAINT STYLE AND CONDITION

The metal parts of both trucks showed evidence of several applications of black paint with a final coat of red applied some time before the car was taken out of service. The wheel sets were not painted. The paint that remained on the trucks was in an advanced state of deterioration, heavily weathered, and, on metal areas, rust-damaged.

The "A" truck bolster (see Fig. 1, appendix) was Douglas fir and had approximately one coat of red paint on it. There was no lettering evident, and it, therefore, appears to be a replacement.

The "B" truck bolster was oak and had at least two layers of black paint. "S.P. 145" was lettered in white on both sides in 3" figures on the front, and 3-1/4" figures on the back. The entire "B" truck had a light overpainting of red.

The spring planks of both trucks were oak. The ends of both truck bolsters were lettered with the stenciled notation "JOUR" in white and in varying sizes and styles. The ends of the spring planks may have been painted with the journal sizes, but evidence of this was lacking.

FRAME - TIMBER AND PAINT CONDITION

The wood members of the car frame were Douglas fir with the exception of the buffer blocks and the handrail supports which clamp the ends of the tank. These were oak. Reuse of existing wood parts was minimal, as they were heavily deteriorated. The end sills were splintered on the corners and the entire front area appeared to have sustained some fire damage. The right outer and both intermediate sills were original or of original type, but poor condition mandated their replacement. The center sills seemed to be sound and were retained.

The frame had sparse remnants of oxide red paint which was generally in an advanced state of deterioration. Extensive flaking prevented an accurate determination of how many layers of paint had been applied to the wood members.

Large items of frame hardware (truss rods, brake gear, draft gear, etc.) had black paint on them under the red. The outside grab irons, stake pockets, and posts were red, while the grab irons at the end of the tank were black.

FRAME - EXISTING LETTERING

Examination of the wood frame of the tank car revealed limited information. The following information was noted:

Right Side Sill

"A" End: Bearing packing information was printed on the "A" end of the sill approximately centered between the two forward stake pockets. The lettering

appeared as white paint stenciled on the sill which was painted red. The remaining paint was brittle and flaky. Upon examination, two overlaying dates were apparent, following the standard repacking information. The lettering appeared in the following form: R P K D O Y O 4 20 56 (see Fig. 2A - 2B)

S P 10 22 54

The preliminary location information -- RPKD (repacked), OYO (Owenyo), and SP (Southern Pacific)--appeared only once in front of the two dates. This suggested that when the wheels were repacked in 1956, only the old 1954 date was repainted, with the preliminary information serving for both dates.

Center: Located on the center portion of the right side sill was information apparently related to brake cylinder servicing. The information disclosed was:

OYO 4 20 56 (see Fig. 3A - 3B)

SP 10 22 54

The letters indicated only the location of the servicing (Owenyo, SP). This notation served for both dates found on this part of the car. The dates of servicing coincided with repacking data found elsewhere on the car.

Left Side Sill

"B" End: Located on the left side sill was the repacking information which matched that noted on the right sill. The lettering, appearing as white on

red, was centered between the two rear stake pockets. The information revealed was:

RPKD	OYO	4	20	56	(see fig. 4A - 4B)
SP		10	22	54	

As with the data on the right side sill, the preliminary location information - RPKD OYO - appeared only once; therefore, it was assumed that it was used for both dates.

The lettering for all of the repacking information varied in height from 1-1/4" to 1-1/2".

AIR BRAKE CYLINDER AND RESERVOIR

When received, the air brake cylinder and reservoir assembly was covered heavily with oil and what appeared to be sand. This mixture was of various consistencies, ranging from soft and pliable to hard and crusty. Appearance ranged in color from black to a whitish tint. Paint was present over most of the assembly except for the triple valve which was bare and rusty. The cylinder end was painted predominantly with black and red lead paint. The reservoir was painted black. Where there was excessive oil covering the surface, the paint was soft and rubbery. In the process of scraping the oil, it was found that the paint was a separate but similar layer to the oil. Great care was taken since too deep a cut would result in the loss of the markings.

A complete examination of the assembly revealed two major groups of markings. On the right side of the cylinder were two notations, "CLEANED" and "OILED," which were clear and easy to uncover. The corresponding dates were absent though, possibly due to premature needlegun work. After defining the words, photos were taken with and without chalking the letters. A tracing was made of the two words, with the paper set flush against the rear flange and the top bracket. The letters were in excellent condition. (see Fig. 5A.)

The markings on the reservoir tank varied in quality. The latest and most prominent marking was: SPK. 9 20 26 (see Fig. 5B)

S.P. CO.

This notation was quickly and easily discerned after removing a heavy layer of oil. In the next lower layer, directly under the "9", was the word "LAWS". In that same layer, immediately following the "S.P. Co.", was an older and fainter "O" which appears to belong with the "LAWS". The "P" and "LAWS" seen lower on the reservoir were very faint and hard to define, though their outlines were clearly detectable.

Analysis -

The information concerned with the "CLEANED" and "OILED" notations found on the air cylinder was important as an indication of the type of markings placed on the cylinder, but require a date to be useful as restoration features. Further research did not reveal the required date information.

The information on the reservoir was an important and apropos feature for the restoration of the tank car. The "SPK. 9 20 26" notation corresponded to other data discovered on various parts of the car, and added to the body of information which could be related directly to a specific time frame, the 1920's.

TANK - INTRODUCTION

The tank surface was in generally poor condition when physical research was begun. The numerous layers of black paint and quantities of lettering that had been applied to the tank over the years were heavily weathered, allowing much white lettering to become visible. The upper areas suffered from extensive surface rusting, and the sections near the dome were covered with spilled oil deposits. Most remaining paint was dry and scaling, although in a few areas the paint was pliable and in surprisingly good condition.

When physical research was begun on the tank, it was hoped that sufficient information could be discovered to accurately reconstruct all the paint schemes that had been applied to it. A wealth of material was found, and our efforts were fairly successful. However, due to the irregularly weathered and rusted condition of the tank surface, it was virtually impossible to relate lettering found on one part of the tank to that found on another through the determination and comparison of in what layer the lettering existed. It was assumed that the lettering on both sides of the tank was largely identical, thus allowing for the reconstruction of possible lettering patterns from apparently matching fragments found on both sides. An example of this was the lettering that exists on the right front and left rear sections of the tank.

These areas had the tank test and maintenance data painted on them, but insufficient remnants of the paint exist to postulate an acceptable interpretation from either side alone. Correlating the two sections gave a much better picture of the lettering that was on them.

TANK - ENDS

The tank ends were classified "A" and "B", based on their location on the car. In comparing the two ends of the tank, the following information was determined concerning the lettering scheme:

Level One - (oldest layer) See Figures 6A & 6B.

On both ends, notations were discovered which referred to the construction of the tank. The lettering, which read "Order 474 11/16 holes in flg.", appeared on both ends. The characters were painted over a gray primer coat in freehand style. The axis of the letters was at an angle which suggested that the information was painted on the tank while the pieces were as yet unassembled. This information was obtained after light sandblasting.

Level Two - See Figure 7.

On the front end of the tank, definite markings were found denoting the early gallon capacity of the tank--3,265 gallons:

CAPACITY

3265 GALS

All later information which was evident on the ends and sides of the tank noted the capacity as the high amount of 3,300 gallons.

From the quality and color of the paint, it was provisionally determined that the early marking appeared on the tank by itself, independent of any road name or number designation. This is based on the possibility that for the first 20 years of the existence of the tank on the flat car, all information was placed on the body; and in the early era, "3265" was listed as the capacity. On the "B" end, slight traces of paint were detected on the lower portion of the tank, in the same position as that found on the "A" end. It is assumed that this marking matched the information on the front end.

Level Three - See Figures 8A & 8B.

On both ends of the tank, there were fragmentary remains of "S.P. 145," which appeared to be the oldest road name and number notation evident. This marking was the highest on the tank end, with subsequent letterings painted over the lower portions. In conjunction with this early "S.P. 145", a revised capacity notation "CAPY 3300 GALS" appears to be contemporary, and existed on both ends of the tank. It was deduced that these two pieces of data belong together because of: (1) paint color and condition, (2) spacing from the "S.P. 145" to the "CAPY 3300 GALS", and (3) the fact that subsequent paint layers overlaid them. The capacity information, moreover, was located directly under the handrail. Because it is unlikely that markings would be placed under tailings, it was assumed that the notation was applied before handrails were installed and was, therefore, an early marking.

Level Four - See Figures 9A & 9B

The next chronological paint scheme appeared to be a combination of "S.P. 145" and "CAPY GALS 3300" and was located on both ends of the tank but in a lower position than the scheme of Level 3. This scheme consisted of the "S.P. 145" placed above the handrail and the "CAPY GALS 3300" below the handrail.

On the "B" end, however, the "145" had been painted over with a patch of red lead primer. Also, in a lower layer directly under the "CAPY GALS 3300" was another notation which emerged as "CAPY 3300 GALS". These additional facts raised the possibility of two distinct paint schemes. Because the "CAPY 3300 GALS" appeared in a lower and, therefore, older layer, it could have belonged with the "S.P. 145". That paint scheme may then have been badly weathered or painted over with black and replaced when necessary with the simpler notation of "145" and "CAPY GALS 3300". Thus, only the "145" would need to be covered with red lead paint when the time came to renumber the car (see Level Five, following).

On the "A" end, there was a curious configuration in which the "CAPY GALS" was stenciled 3" in height, and "3300" was 4" in height. There are two possible reasons for this. First, the line originally may have read "CAPY GALS 3265", and then when the capacity notation changed, the 3265 was painted over with the larger number, using a different stencil. This hypothesis however, is not supported by the information on the "B" end. Second, when the new capacity notation was added, there may have been two different sizes of stencils available--thus the variance in size.

Level Five - See Figures 10A & 10B

Because of the red lead patch over "145" on the "B" end, it was assumed that this patch was placed to cover "145" when the car was renumbered to "352". In its final position, however, the "352" was placed near the center of the tank, rather than on the "145". On the "A" end, the existing "145" was blacked out, and "352" was painted in register with "S.P". There are no other markings on the tank which correlate with the individual "352".

Final In-Service Appearance - See Photo No. 1.

From the physical evidence on the tank, and the information ascertained from a photograph of S.P. 145 taken by Gerald Best, the final appearance of the tank consisted of the notation "352" painted on all four sides of the tank. Except for the "B" end, which has the "352" in the center, all markings were in register with the previous "145". Road name initials and capacities were not repainted.

TANK - SIDES

For the purposes of description, the tank was divided into five sections based on the number of courses. These were numbered 1-5 beginning from the "A" end, with the numbers remaining fixed regardless of how the tank was oriented.

The tank, being of cylindrical form, offers no flat surfaces. Therefore, all vertical measurements, unless otherwise specified, followed the contour of the

tank. Also, the tank was divided longitudinally into four approximately equal regions along each side. See Figure 11.

Left Section 1/Right Section 5

These sections were two of the more complex areas of the tank in terms of quantity, size and importance of lettering found. These were the last locations on the car for reporting marks, and four distinct applications in two areas were found. As both left section 1 and right section 5 yielded substantially the same information, they will be dealt with together as a composite, distinctions being made only as required.

Data -

- 1) The earliest reporting marks found were the fragmentary remains of "S.P. 145" with bars above and below, located on right section 5 just above the midline. No traces of this scheme were found on left section 1, and no complementary load/weight data was found on right section 5. See figure 12. These markings may predate the reporting marks found on the right section 4 and left section 2.
- 2) About 4" above the markings described above was an accumulation of 7" figures representing at least two applications of "S.P. 145" with one "352" applied over the numbers. This last was the final number, and was on the car when it was retired in 1960. No bars are evident with these marks. See Figures 13A & 13B, 14A & 14B.

- 3) Several inches below this last group of reporting marks were at least two applications of "CAPY 40000" and "LT WT 19000", with a 1926 date evident. See Figure 13A & 13B. These groups of information belonged with the two higher "S.P. 145" applications.

Analysis -

The presumed progression of the lettering in this area is as follows:

a)	b)	c)	d)
	S.P. 145	S.P. 145	352
<u>S.P. 145</u>	CAPY 40000	CAPY 40000	
	LT WT 19000 26	LT WT 19000 9 26	

- a) The earliest reporting mark in this area. There may or may not have been capacity and weight information in the area below the reporting mark in this scheme.
- b) Field applied lettering, rather irregular in letter spacing. The "(9) 26" date is the weight date transferred from Left 2/Right 4.
- c) Virtually identical to (b), but out of register with that applied before.
- d) The car was renumbered in 1947 as No. 352. We do not believe that the car was entirely repainted at that time, but rather the "145" was simply painted out and the "352" applied in its place.

Left Section 2/Right Section 4

As with other areas of the tank, these two sections were assumed to have been painted similarly, and shall be dealt with as one, except where required to differentiate between the two. The fourth course of the right side was the best preserved section of the tank, and in this area was recovered the greatest amount of paint information. Course two on the left, while being in poorer condition and having less paint on it, did provide data to correlate with right section 4, and provided a partial check for it.

Data -

Two sets of reporting marks, capacity and light weight information, were found in this area, both applied at Sparks, Nevada, and both largely identical:

a)

S.P. 145

CAPY 40000 LBS

LT WT 19000 SPK 5-23

(Figure 15A)

b)

S.P. 145

CAPY 40000 LBS

LT WT 19000 SPK 9-26

(Figure 15B)

The road initials and numbers were 7" characters with 1" bars above and below. The capacity and weight data were 3" figures. Beneath these schemes there may have been an earlier lettering pattern, for there was a stray "2" visible in both drawings which cannot at this time be accounted for. Also, some areas of the "S.P. 145" were unaccountably thick (see Figures 15A & 16A).

The two applications of "LT WT 19000 SPK" denoted that the car was weighed at Sparks each time, and either the entire car or just the lettering in this area was repainted. It is not known why the car had to be weighed again three years and four months after the 1923 weighing, but perhaps it was due to accident repairs or major car work.

On the left side section 2, the register between the 1923 and 1926 paintings was not as good as on right 4. By comparing drawings of the two areas, the placement errors became evident (see Figures 16A & 16B). Note particularly the numbers "9" and "23" on each side. Horizontal seam locations probably influenced the location of lettering from one side to the other but, if the lettering here was applied in the same spirit as the lettering on the remainder of the tank, accurate vertical placement was a mere formality.

Analysis -

The lettering found on these sections was apparently applied at Sparks when the car was there. It may have been taken there specifically to be weighed, or it may have been weighed as an incidental aspect of other car work. This lettering is fairly well applied and uniform, distinct from the rather irregular field-applied lettering found on the rest of the tank. It formed a major part of the paint data found for the 1920's period.

Left Section 4

The tank surface in this section was in generally poor condition, showing heavy rust and the virtual absence of paint from about the midline up. Such

paint that remained below this point was weathered and chipped. Two groups of markings were visible in this section: (a) just above the running board near the center of the course (maintenance data), and (b) a few seemingly isolated fragments in a line about the upper third point.

The corresponding course on the other side of the tank (right section 2) was without paint of any kind.

Data -

- a) Scraping in the maintenance data area showed this to be a heavily repainted location where brake cylinder and triple valve maintenance dates had been applied during the 1920's. From numerous layers of 1" characters, two distinct blocks of information emerged, slightly out of register with one another, the earlier layers being under and to the left of the later ones. See Figure 17.

FIRST LAYER (oldest)

SPK 6 3

S.P. CO. .fragment

SECOND LAYER

CYL.-LAWS-

S.P. CO. 6 1

TRIP.-LAWS-

THIRD LAYER

CYL.-LAWS-

S.P. CO. 8 5 21

TRIP.-LAWS-

FOURTH LAYER

CYL.-LAWS-

S.P. CO. 1 29 22

TRIP.-LAWS-

FIFTH LAYER

CYL. -LAWS-

S.P. CO. 2 24

TRIP.-LAWS-

SIXTH LAYER

CYL.-LAWS-

S.P. CO. 6 28 25

TRIP.-LAWS-

SEVENTH LAYER

8 18 28

8 18 28

CONSENSED RELATIONSHIP

CYL.-LAWS-(8 18 28) ←

S.P. CO. 6 28 25 ←layer 6

TRIP.-LAWS-(8 18 28) ←layer 7

(*)

*No lettering was found in
this area, but there may be
information missing.

(The two applications of 8 18 28
seem to overlap parts of the earlier
lettering, and probably are remnants
of a later, lost lettering pattern.)

No markings were found in this area other than the maintenance data, and it is believed that some parts of these markings have been lost through weathering.

- b) Sandblasting of the upper line of fragments removed much rust and overpainting, and clearly disclosed these marks to be the remains of "CENTRAL PACIFIC" in 2-1/4" letters of a tall roman style encountered nowhere else on the car. See Figure 18. Some undecipherable fragments existed under and to the right of these letters. See Figure 17.

Further sandblasting in this section uncovered numerous small patches of rust that at first appeared unrelated. When viewed as a group, however, it became apparent that these were the residual traces of order information applied by brush to this section before it was joined with the rest to form the tank. It consisted of three lines of large irregular hand painted characters reading "SMALL TANK OR__R 474" which ran vertically on the tank side. See Figure 19. These data correspond with almost identical markings found on both ends. See Figure 6A & 6B.

Analysis -

The air brake dates, while not in themselves conclusive of anything, provide additional lettering data from the 1920's, and the notation "LAWS" adds to our understanding of S.P. narrow gauge maintenance practices.

The lettering "CENTRAL PACIFIC" is a significant find in that it demonstrates that this car did in fact carry the name Central Pacific on it.

Unfortunately, we cannot suggest with any assurance how this "CENTRAL PACIFIC" fits in with other lettering on the tank.

Finally, the order number, which was applied to the metal of the unpainted tank sections, and which corresponds with the numbers found on the ends, virtually guaranteed that the tank was originally built in its present form.

Left Section 5/Right Section 1

Right Section 1 -

Examination of this area of the tank yielded a varied amount of fragmented information concerning the servicing and testing of the tank and car frame. Upon receipt of the car, minimal information was discernable. The most evident characteristic was the patch of red lead paint which measured approximately 20" by 30". Before exploration was started, the only information visible was the "7-7-49" date, which appeared as raised ridges beneath the red lead paint. In this section, remnants of seven distinct dates were found. These dates, preceded in three cases by location information, were assumed to be repacking dates. This is not a definite fact because only one "RPKD" notation was discovered, and it appeared to be the oldest marking in the section.

Level One:

RPKD - "R" was fragmented, and "PKD" was faint but complete. This marking was the oldest information in this area. See Figure 20A.

Level Two:

OYO 11-23-36 Characters are 1" in height. See Figure 20B.
SP

Level Three:

OYO 2-16-38 Appears that the OYO was utilized from the
SP SP
earlier 1936 date. See Figure 20C.

Level Four:

OYO 5-13-39 Characters are 1-1/2" in height. See Figure 20D.
SP

Level Five:

OYO -29-41 The month notation is missing. Beneath the "2" is a
SP clearly defined "4" which appears to be independent
from subsequent lettering. It is assumed that
originally there was a notation predating the 1941
date. See Figure 20E.

Level Six:

OYO 4-12-43 This date appears to use the same location information
SP as the 1941 date. See Figure 20F.

Level Seven:

7-7-49 This date notation overlaid all other information and
was the first discovered date in this area. In
conjunction with this date, there is a four letter
group which appears to coincide in time. The four
letters appear to be "RAKE", and could form the final
portion of the word "Brake". These letters, though
over all previous layers, were faint and difficult to
discern. The characters were 2" in height. See
Figure 20G.

Above this main body of information were fragments which suggested a
significant amount of lettering. Since the paint was either absent or badly
deteriorated in this area, discernment of information was difficult if not
impossible. The only information clearly present was a reference to "OYO",
and this would suggest that earlier dates once occupied the area. (See Figure
20H.)

Analysis -

Though a complete example of a repacking notation was not present in this area, the placement and alignment of the various dates and location data suggest a usable format. The repacking information apparently was placed in three lines on the left side of R-1 and L-5. The various dates found on R-1 confirm a general pattern of location and date on one line with "SP" directly below. "RPKD" was found alone and is assumed to have been placed above the location and date.

Tank Pressure Test Information -

On the forward portion of right section 1 was information which appeared to relate to tank pressure testing. Because of the deteriorated condition of the paint, the collection of useful data was difficult.

Investigation of this area revealed various fragments of information which represented several groups of tank and safety valve testing data. It was determined that the fragments were part of two different paint applications done in 1923 and 1926. The meaning of each marking is described below.

1923 Information -

See Figure 21A.

E 5 2

--- This was the highest marking in the area and denotes "Tested 5-23" for the safety valve.

25 LBS

--- Refers to the pressure test applied to the safety valve.

A

--- Located one line below "25 LBS".
This character is the first letter of "AT" - denoting the location on the testing.

T 5 23

--- "Tested 5-23" - for the tank.

PRESS RE

--- Following this notation would be the pressure to which the tank was tested.

BY

--- Two lines below pressure, this word marks the designation of the company doing the testing.

1926 Information

See Figure 21B.

TAN

--- Denotes "TANK" - stenciled with unique form - narrower than lettering found elsewhere on the car.

TESTED 5 26

--- Date tank was tested.

RESSURE CHE

--- This group of letters probably says "Pressure Checked", which is a deviation from the standard form.

Other Information

See Figure 21C.

33

--- May be a reference to a test date.

TRIPLE

--- Reference to servicing of the triple valve.

Analysis - (See discussion of Left Section 5, following)

Left Section 5 -

Ideally, the information located in this area of the tank should resemble that on right section 1 in terms of information content. Like the right side, the information remaining in this area was fragmented and incomplete. Fortunately, the information is of a different content and tends to supplement the right side data.

Data -

The apparent benchmark which appeared on both sides is the stenciled reference "TANK" which was a unique thin configuration. This marking appears in the same vicinity on both sides. Also, below this on both sides was the

notation "25 LBS". Though not contemporary with the "TANK", it probably refers to tank pressure. See Figure 22A.

There were two definite fragments (RESS and S URE) which denote the word "PRESSURE". There were also two groups (TESTE and TED) which denote the word "TESTED". See Figure 22B.

Unlike the right side, there were no remaining fragments of definite testing dates. Following the "TANK" was a "3" - this numeral could correspond possibly with the "23" on the right side. See Figure 22B.

New information, in addition to the right side, were two references to "SAFETY". The first is "SAFETY VALVE" and was located in the highest position in relation to the remaining information on the section. This lettering appeared to be hand lettered. The second reference is "SAFETY". Directly above this is "UN T". These two words are independent and denote no positive meaning. "SAFETY" was hand lettered and "UN T" was stenciled. See Figure 22C.

Analysis -

A comparison of the fragmented information on R-1 and L-5 with standard Association of American Railroads lettering requirements for pressure testing of tanks revealed a consistent and usable basis for structuring a workable model. The required format is as follows:

SAFETY VALVE

TESTED (date)
PRESSURE (in pounds)
AT (location where tested)
BY (company name)

TANK

TESTED
PRESSURE
AT
BY

Information from the tank, when combined from R-1 and L-5, shows this distinctive pattern clearly. From this information, which was properly aligned, a stencil pattern was derived as follows:

SAFETY VALVE

TESTED 3 26 (date found on R-1)
PRESSURE 25 LBS (found twice on tank)
AT MINA (facility most likely to do pressure
testing on S.P. n.g. in 1926)
BY S.P. CO.

TANK

TESTED 5 26
PRESSURE 40 LBS (normal pressure test level)
AT MINA
BY S.P. CO.

CONCLUSIONS AND RESTORATION

PAINTING AND LETTERING: GENERAL CONCLUSIONS

The program of physical research yielded a prodigious amount of information, but not all of the lettering and markings found on S.P. No. 145 could be satisfactorily explained. Most could be positively associated with an era and paint scheme, some were questionable, and a few continue to defy interpretation.

Four distinct schemes for reporting marks and numbers were established from evidence found on the tank (see discussion of L-1/R-5 and L-2/R-4), not including some major fragments ("CENTRAL PACIFIC", "3265 GALS") which may belong to one of these or represent part of a fifth scheme. There was also a great quantity of minor lettering concerning capacity, weight, and maintenance information. Some of this data was successfully related to major lettering and number locations by correlating dates or placement, but some could not be convincingly integrated into an overall pattern.

Much of the lettering we found was applied in a very informal, almost haphazard, manner during the service life of the car. This lack of uniformity greatly hindered our attempts to infer paint schemes for one side or end of the car from the other, but throughout we operated on the assumption that the sides and ends were painted similarly, except, of course, when demonstrably otherwise. Condition, color tint, size and style of lettering, relative locations and dates, when present, provided clues to the total arrangement.

Some ambiguities were tentatively resolved by placing lettering where it might logically belong.

Another major variable was the weathering which the car underwent between paint jobs. It was impossible to know how much of a painting scheme remained when the car was repainted and lettered. This weathering -- the action of wind, sand, sun, and temperature -- helps to explain why only fragments of lettering existed at otherwise well-preserved levels: they were gone before the car was repainted. Contrasted with this condition were those places which received protection from the elements in the form of oil accumulation or overpainting and were consequently in very good condition. These areas, particularly the periodic maintenance dates, provided a wealth of incidental material.

We have more solid data on how the car was painted during the middle-1920's than any other era. Based on what we have derived from the car itself, the car frame during this period was oxide red, the tank and frame hardware were black, as were the trucks. The dome was probably white. Various metal parts that had rusted over the years (railings, hand grabs, brake staff components, buffer block plates, truss rod ends, etc.) had no evidence of paint on them. As it was not known what color they were painted, the decision was made to paint them black unless this caused a conflict with other painted areas.

Car lettering consisted of the lettering depicted in Photos No. 7, 8 : "S.P. 145" in 7" characters with 1" bars above and below located on the second section from the left end on each side. Below this was capacity and light

weight information in 3" Figures. Tank and safety valve inspection and test data would occupy the far right sections. Other periodic maintenance information would be located around the tank and frame. The ends featured "S.P. 145" at the top center location in 4" letters, with the capacity in gallons stenciled across the center.

This paint scheme was our recommendation for Southern Pacific narrow gauge tank car No. 145. The lettering style used during the 1920's is well documented, attractive, and corresponds well with the car's ca. 1920's physical restoration period.

SUMMARY OF RESTORATION PROCESS

For several reasons, the decision was made to restore tank car No. 145 to its 1920's appearance. By far the largest amount of empirical evidence discovered on the car itself was connected directly to that decade. The reporting marks, brake cylinder and triple valve maintenance data, and tank pressure test information all contained dates from the 1920's. Archival research into S.P.C. and S.P. narrow gauge history and practice also revealed sufficient information to permit a cogent interpretation of the car in that time frame. Moreover, the museum had in its collection several other examples of narrow gauge freight equipment from that period, and it was felt that the restoration and display of those pieces as a complete 1920's narrow gauge freight train would significantly enhance their interpretive value both as individual pieces and as a coherent group.

After all available physical evidence was gathered from the car frame and tank of S.P. No. 145, the process of restoration was begun. The handrails, posts, stake pockets and running boards were removed to facilitate access to the tank. The tank, which had deposits of dried crude oil located on the section below the dome, was scraped. Two hundred gallons of oil which remained in the tank were drained, and the tank was then removed from the car and placed on blocks outside the shop. There it was sandblasted to remove all oil, paint, and rust on the surface, and was sprayed with a coat of red lead primer.

The frame was disassembled beginning with the removal of the couplers and draft gear. Next the end sills, buffer blocks, buffer plates, and draw timbers were removed and the air brake equipment disassembled. The side and intermediate sills were removed from the car, along with the tank band hooks, tank blocks, and truss rods. The needle beams were detached from the frame, and the center sills, connected to the metal body bolsters, were lifted from the trucks. The trucks were dismantled and all of the metal parts cleaned and sandblasted.

The major concern during the restoration of Southern Pacific narrow gauge tank car No. 145 was the replacement of its deteriorated wood components and rehabilitation of the metal parts. Both for structural integrity and cosmetic appearance, it was decided to replace a very large percentage of the wooden car frame. Much of the existing wood was heavily deteriorated and unsuitable for reuse. The only wood members to be reused in the restoration of the car were the two center sills, one spring plank, and the brake cylinder/reservoir block.

The Railroad Museum's Engineering and Design Department developed plans for the replacement of wood parts. Each required piece had a fabrication drawing made and was then produced by the woodshop. New wood pieces were manufactured to conform to the earliest original parts whenever possible. An example of this was the reproduction of the side sills. The right side sill was an original member from 1892 construction. Unlike the left side sill, which was a replacement, the right side sill was chamfered along the lower edge. The new outer sills were, therefore, constructed to conform to the configuration of the original timbers. Replacement parts were fabricated using original-type materials in all except three cases (see following section, Alternative Materials Used in Restoration).

The center sill/body bolster assembly formed the basis for the reconstruction of S.P. No. 145. The sills, which were covered with a one-inch thick deposit of oil near the center, were cleaned and prepared for painting. The bolsters were cleaned and the entire assembly was placed on blocks. New needle beams, intermediate and side sills were fabricated, as were the two end beams. As the new frame was assembled, work on other components also progressed. Two new bolsters and one spring plank were prepared for the trucks. The truck components were reassembled and painted black. The tank received two coats of black enamel paint. Small metal parts were scraped or sandblasted, primed, painted, and reinstalled in their original locations on the reassembled frame. Those parts which were missing or deteriorated beyond reuse were replaced. Like the new wood parts, new metal pieces were fabricated to duplicate original parts on the car.

After all of the wood components of the car frame had been assembled, the entire unit was spray-painted with red lead paint. The trucks were rolled under the frame, and the truss rods, couplers, brake gear and safety appliances were attached. Before the tank was mounted on the frame, the car was sprayed with a finish coat of red paint. The tank was then set on the frame, and the tank bands were attached. Finally, the stakes and handrails were placed in position.

Stencils were prepared from original 1926 lettering found on the car, and the lettering was applied to the tank, air reservoir, and truck bolsters. The restoration of the tank car was completed with the installation of newly fabricated brake shoes, queen post and bearing pad castings, the adjustment of the truss rods, and a final paint touch-up.

ALTERNATIVE MATERIALS USED IN RESTORATION

WOOD COMPONENTS

General deterioration of wood parts mandated replacement of all components except the center sills, air cylinder block, and one spring plank.

All wood parts were replaced with like materials (Douglas fir) except the following:

- Truck bolster and spring plank on "B" end; oak replaced with Douglas fir.

- Both buffer blocks; oak replaced with Douglas fir.
- Tank end handrail stanchions; oak replaced with Douglas fir.

METAL COMPONENTS

All metal parts used in restoration were original except for the following, which replaced missing parts or parts too badly deteriorated to reuse. New parts are identical-type old components, or new production parts fabricated for this car.

- 6 intermediate coil springs in trucks.
- 1 queen post casting.
- 3 truss rod body bearing castings.
- 8 brake shoe castings.
- 4 HRS sill steps.
- 1 HRS truck bolster wear plate.
- Retaining valve and piping.
- 40% of small hardware parts (nuts, bolts, washers, keys, etc.).

APPENDICES

CHRONOLOGY

by CP Sacto Shops

- 12-2-1892 Built for the South Pacific Coast Railroad and placed into service as narrow gauge flat car Third No. 631. Wood body and under frame, length 30 feet, width 8 feet, capacity 20 tons. Cost new \$600.
- 6-7-1902 Knuckle couplers, Westinghouse air brakes and safety appliances added.
- ca. 1904 Tank added, reclassified as South Pacific Coast Oil Tank Car No. 631. Lt. wt. 18,900 lbs., capacity 3,265 gallons.
- 1904-1909 Moved from California coast to Western Nevada, on Nevada & California Railway as S.P.C. No. 631.
- 6-30-1909 Sold for \$290 to Nevada & California Railway, became N & C Oil Tank Car No. 145.
- 3-1-1912 Revised valuation, \$300.
- ca. 1912 Transferred to Central Pacific Railway as n.g. Oil Tank Car No. 145.
- 5 - 23 Weighed at Sparks, Nevada. Capacity 40,000 lbs., lt. wt. 19,000 lbs.
- ca. 9-20-26 Weighed at Sparks.
- ca. 1927 Ownership transferred to Southern Pacific as n.g. Oil Tank Car No. 145.
- 2-18-1947 Renumbered Southern Pacific Railroad n.g. Oil Tank Car No. 352.
- 4-30-1960 Last operated on Southern Pacific narrow gauge.
- 12 6-27-1960 Presented to Railway and Locomotive Historical Society, Pacific Coast Chapter.
- Trucked to Western Pacific Railroad Sand House, West Oakland, California for storage.
- 9 - 1964 Trucked to former Key System Railway Inspection Barn, Oakland, California, for storage.
- 8-10-1969 Presented to State of California for restoration and display at California State Railroad Museum, Old Sacramento, California.
- 2-24-1977 Trucked to Unit Shop, Sacramento General Shops of Southern Pacific Transportation Company, for restoration by California Department of Parks and Recreation.

4-29-1977

Completion of restoration to ca. 1926 appearance as Southern Pacific n.g. Oil Tank Car No. 145.

7 - 1977

Trucked to West Sacramento, California for storage until completion of California State Railroad Museum History Building.

LETTERING SIZES USED IN 1923/1926 PAINT SCHEME

<u>Type</u>	<u>Style</u>	<u>Size</u>	<u>Letters Required</u>
Reporting Marks End	Roman	4"	S.P. 145
Side		7"	S.P. 145
Capacities/Weights End	Roman	3-1/4"	CAPY 3300 GALS
Side		3"	CAPACITY 40000 LBS. LT. WT. 19000 SPK. 9-26 (or 5-23)
Truck Bolster Ends	Block	1" and 1-1/2"	JOUR
Side	Roman	3" or 3-1/4"	S.P. 145
C.P. Marks	Tall Roman	2-1/4"	CENTRAL PACIFIC
Maint. Data	Block	1"	(several possible)
Repack Information	Block	1-1/4" and/or 1-1/2"	(several possible)

All lettering is white.

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3. Narrow Gauge Rosters of the Nevada and California Railway, the South Pacific Coast Railroad, and the Southern Pacific Company.
4. Personal Sources: Researchers discussions with Gerald M. Best, Richard C. Datin Jr., and Stephen E. Drew.
5. Records and correspondence of the Southern Pacific Company.
6. "Report of the Committee on Tank Cars", Railway Age, June 1920.
7. The Official Railway and Equipment Registers, New York, The Railway Equipment and Publication Company.
8. Turner, George, Narrow Gauge Nostalgia, 3rd ed., Corona del Mar, CA, Trans-anglo Book, 1965.
9. Turner, George, Slim Rails Thru the Sand, 3rd ed., Costa Mesa, CA, Trans-anglo Book, 1964.

A-3152C

Figure 1 - WHEEL AND AXLE PLACEMENT ON TANK CAR #145

3/18/77

FRONT ("A")

(found on outside)
Southern Pacific Co
Sacramento Calif
7 21 1925

#W 830

Southern Pacific Co
Sacramento Calif
11 1 1927

#W 830

(found on axle)

SPK 41 52

Southern Pacific Co
Sacramento Calif
7 21 1925

#W 830

Southern Pacific Co
Sacramento Calif
11 1 1927

#W 830

LEFT SIDE

RIGHT SIDE

Southern Pacific Co
Sacramento Calif
8 1 1927

#W 830

Southern Pacific Co
Sacramento Calif
8 1 1927

SPK 3 10 10 27

Southern Pacific Co
Sacramento Calif
6 28 1927

#W 830

Southern Pacific Co
Sacramento Calif
8 1 1927

SPK 3 10 10 27

REAR ("B")

All nos. & information are cast or incised on the wheels & axles.
Casting number is the same on all 8 wheels. (#W 830)

Note: Drawing is not to scale

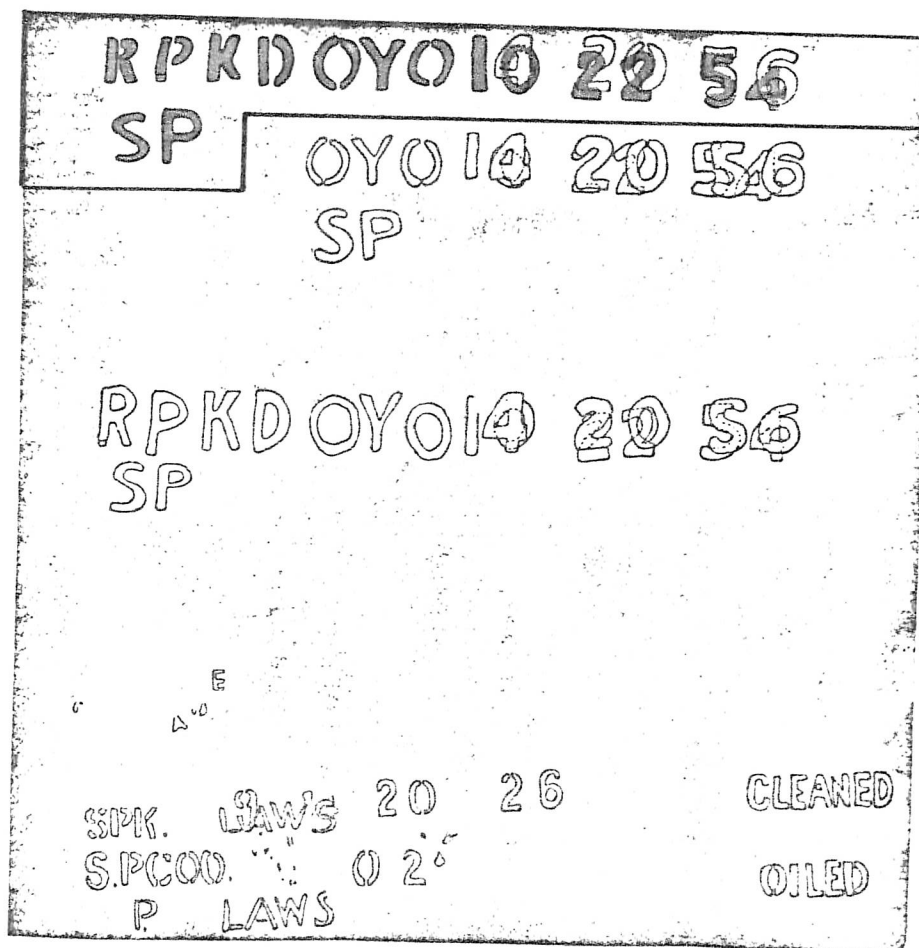


Fig. 2A - Frame: Right Side Sill, "A" End.

RPKD OYO 14 20 56	
SP	OYO 14 20 56
SP	
RPKD OYO 14 20 56	
SP	
SPK. LAWS 20 26 S.PCOO. 0 26 P. LAWS CLEANED OILED	

Fig. 2B - Frame: Right Side Sill, "A" End

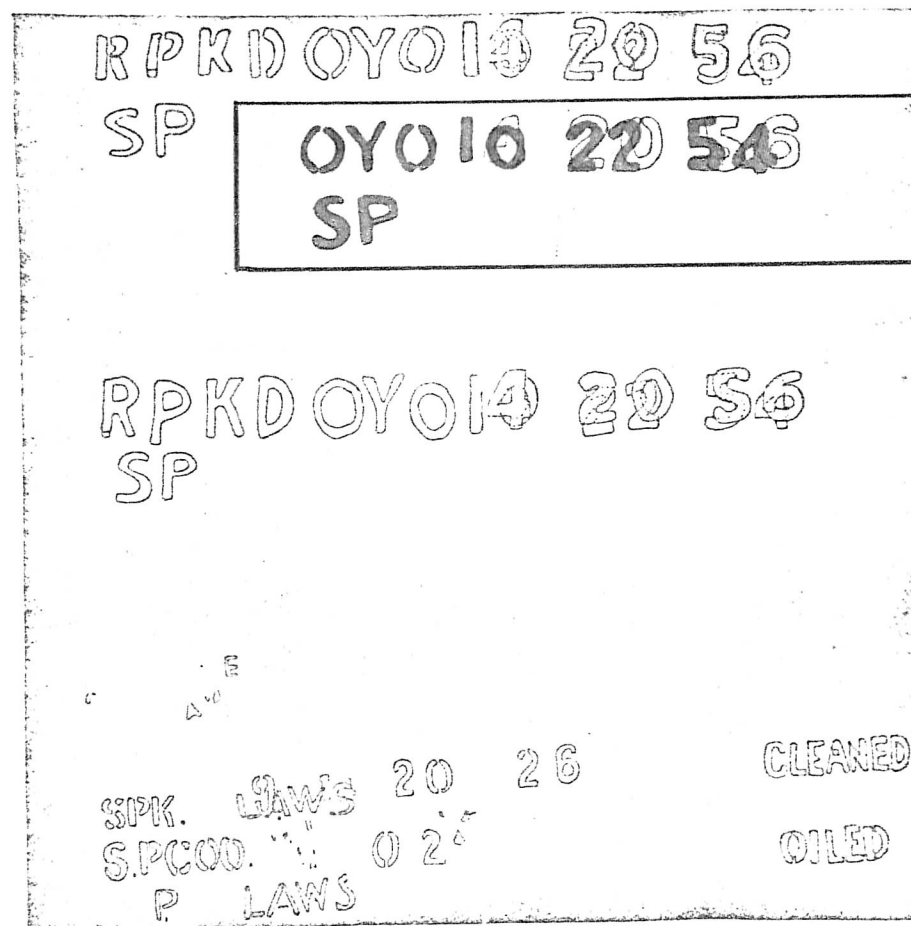


Fig. 3A - Frame: Right Side Sill, Center.

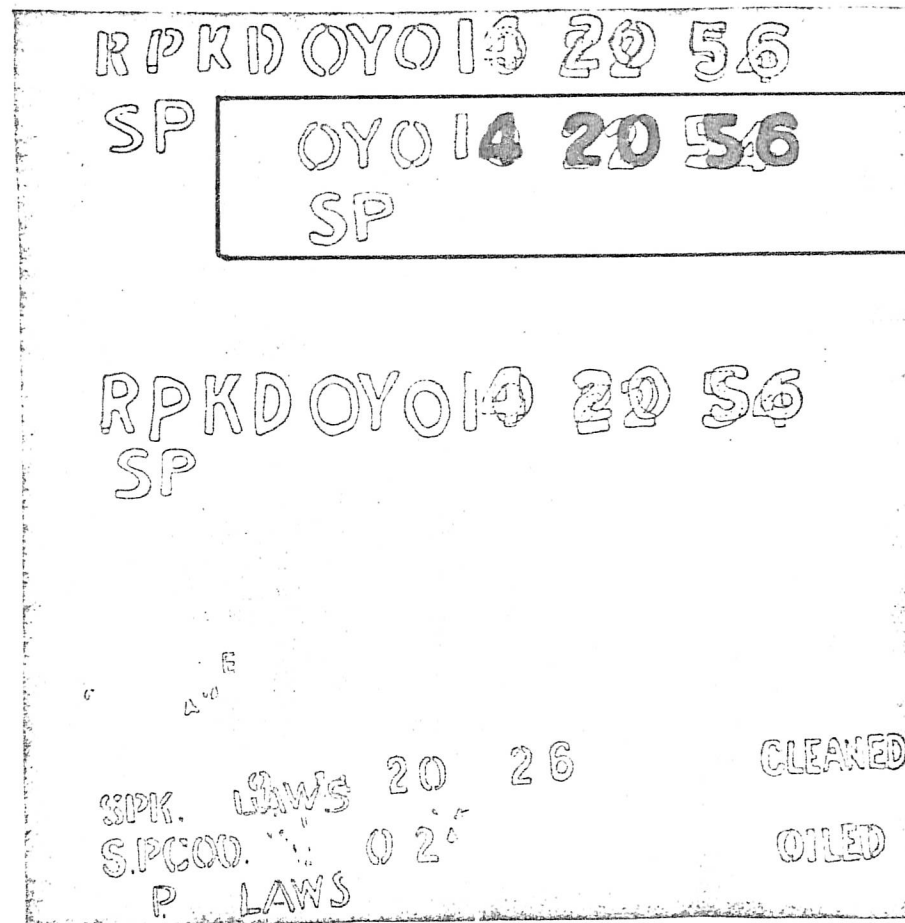


Fig. 3B - Frame: Right Side Sill, Center.

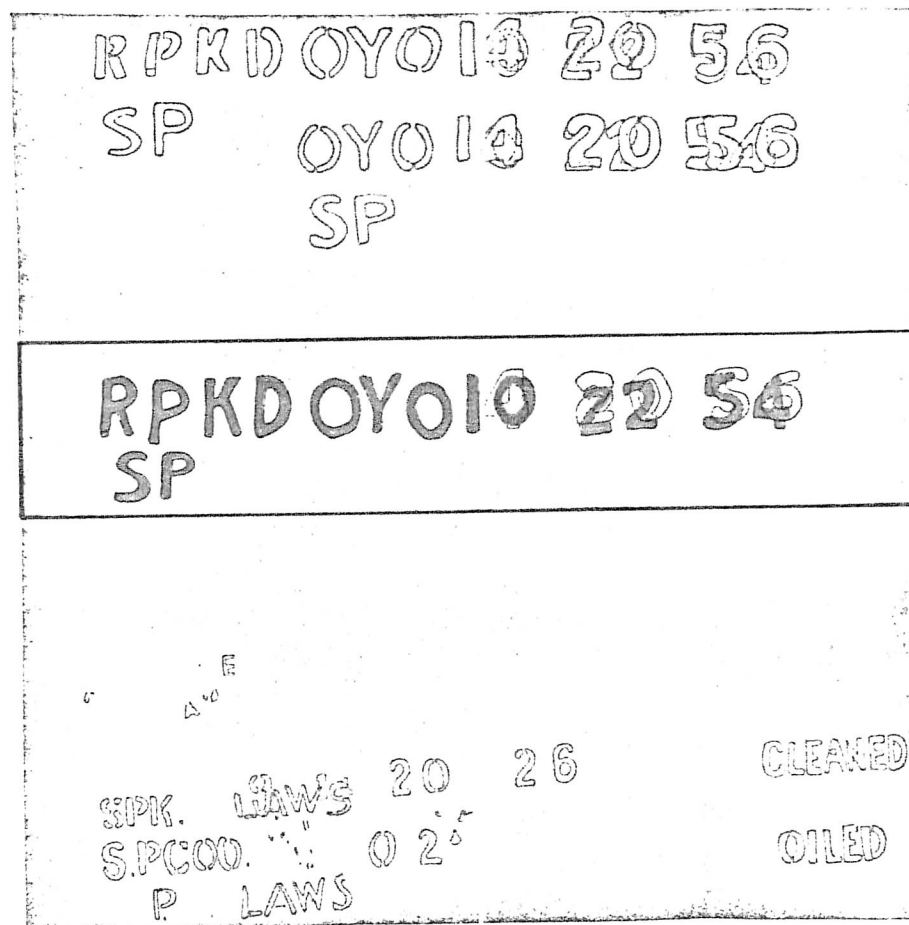


Fig. 4A - Frame: Left Side Sill, "B" End.

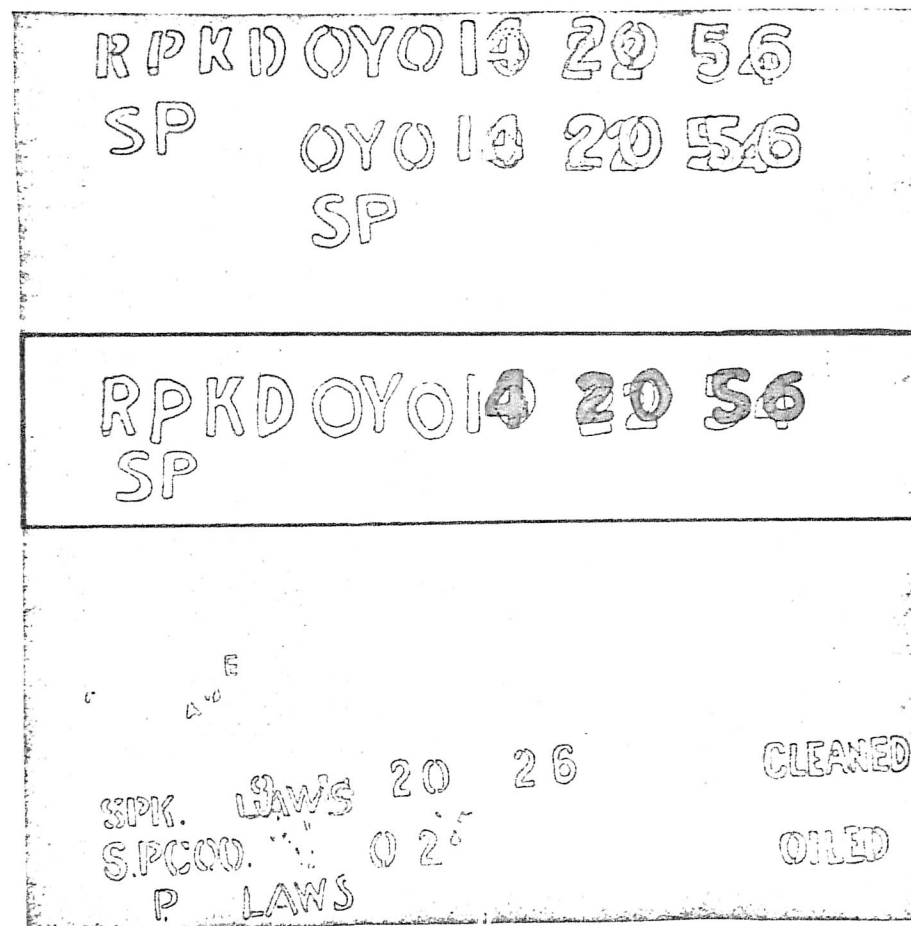


Fig. 4B - Frame: Left Side Sill, "B" End.

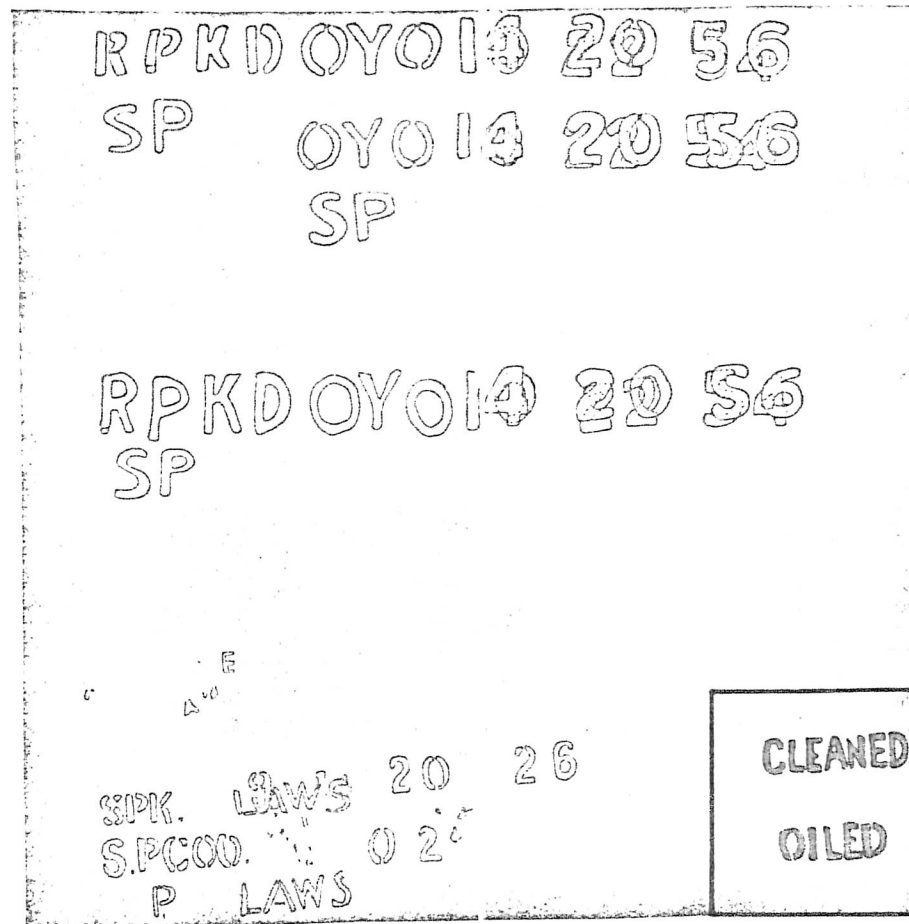


Fig. 5A - Air Brake Cylinder.

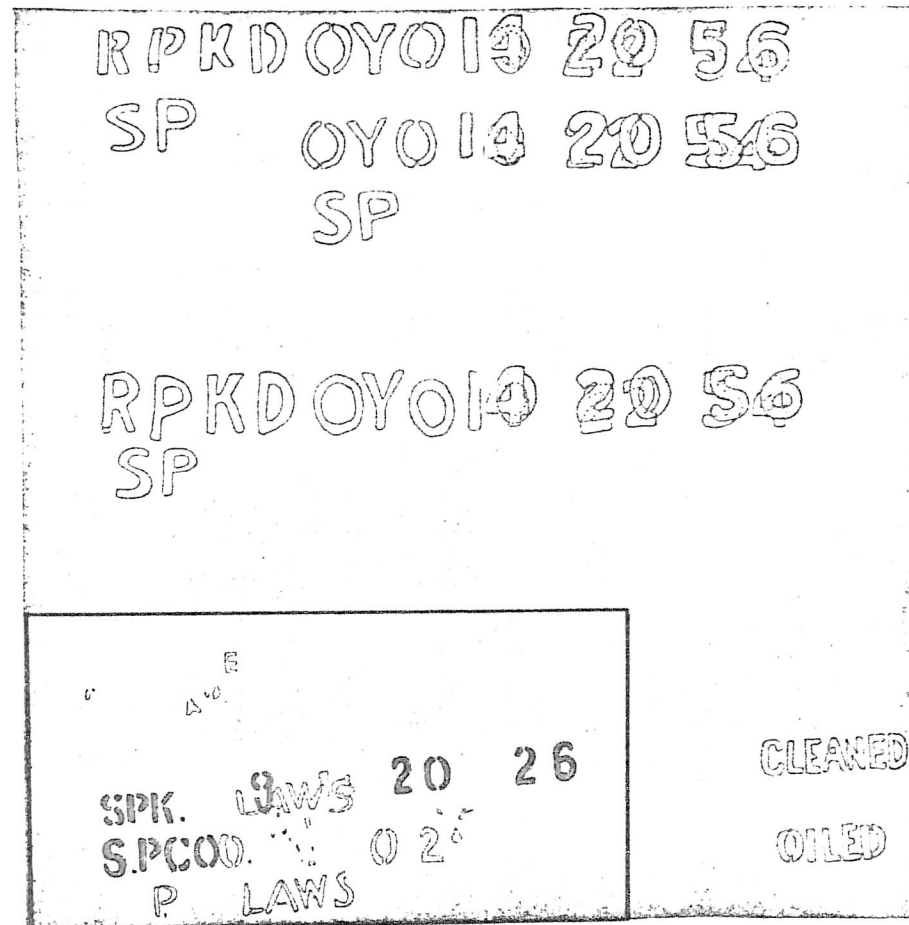


Fig. 5B - Air Brake Reservoir.

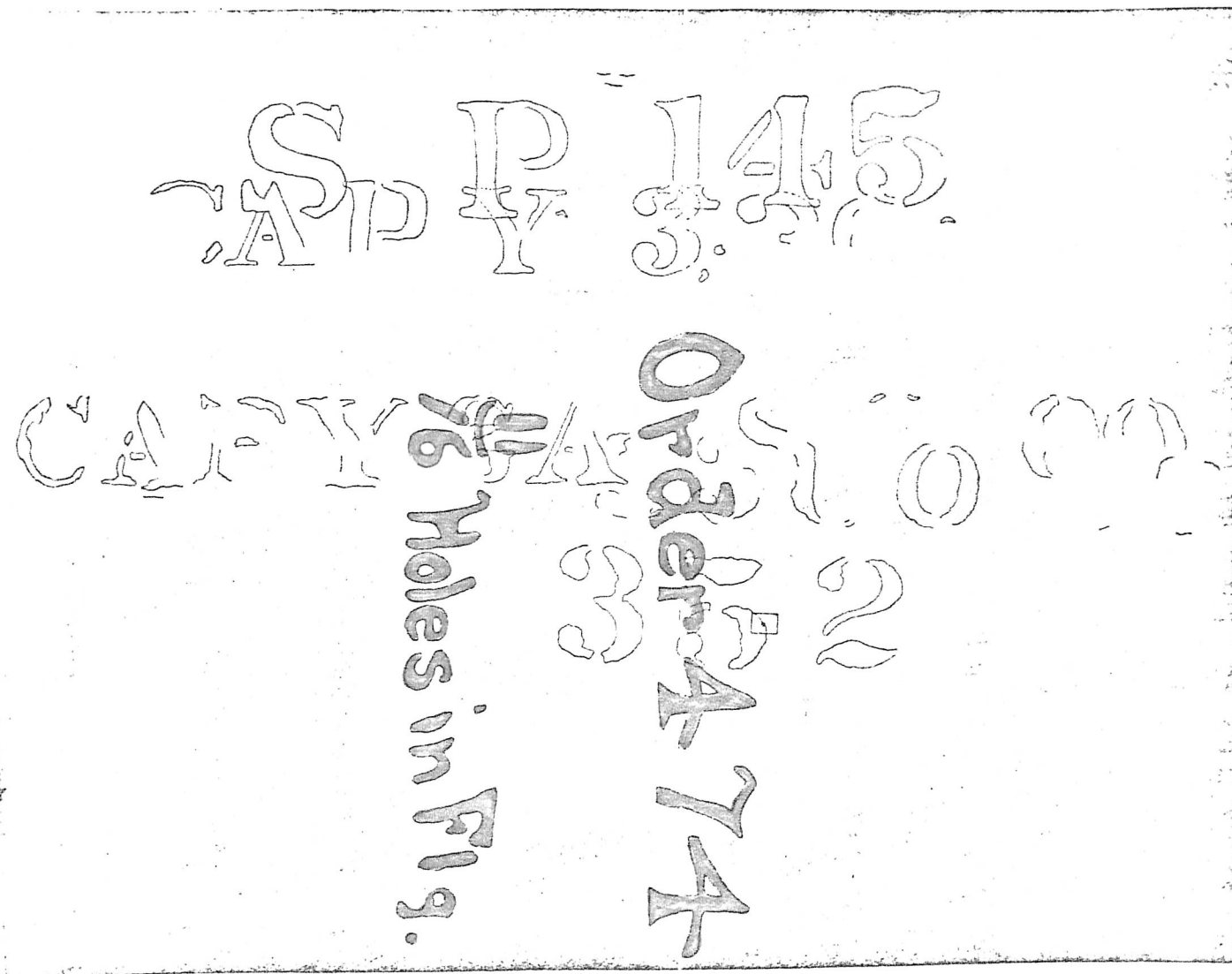


Fig. 6A - Tank: Ends.

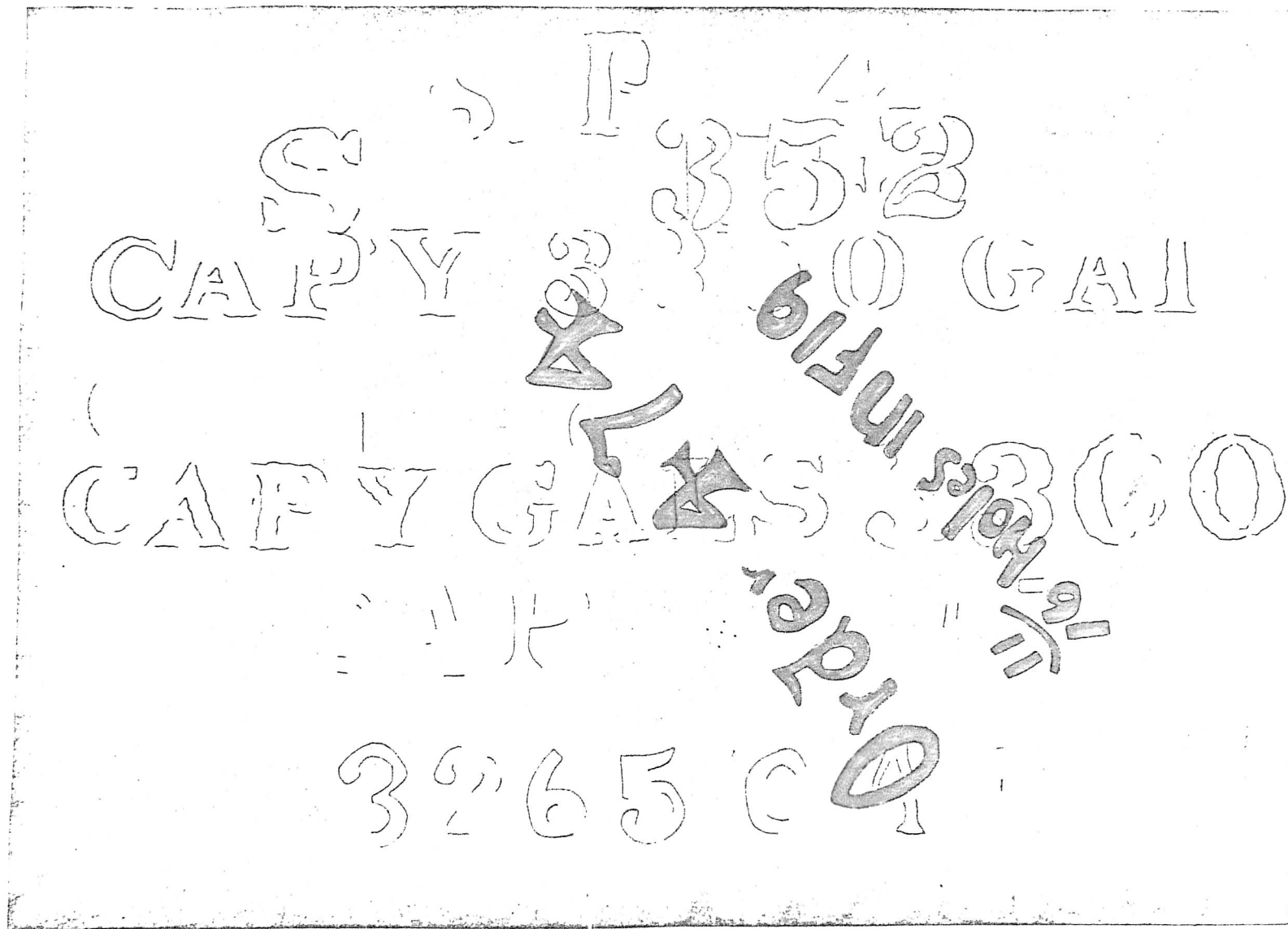


Fig. 6B - Tank: Ends.

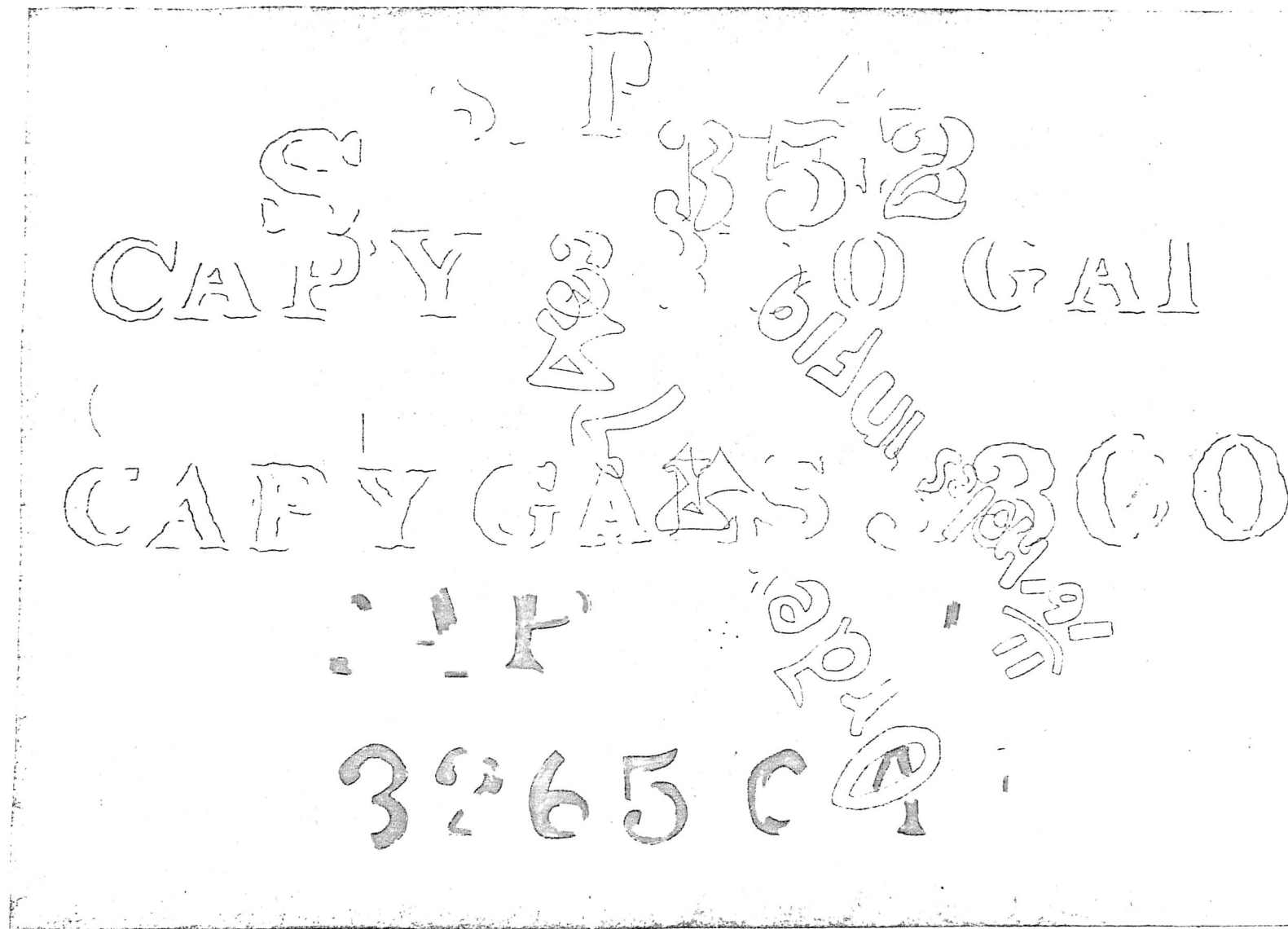


Fig. 7 - Tank: Ends.

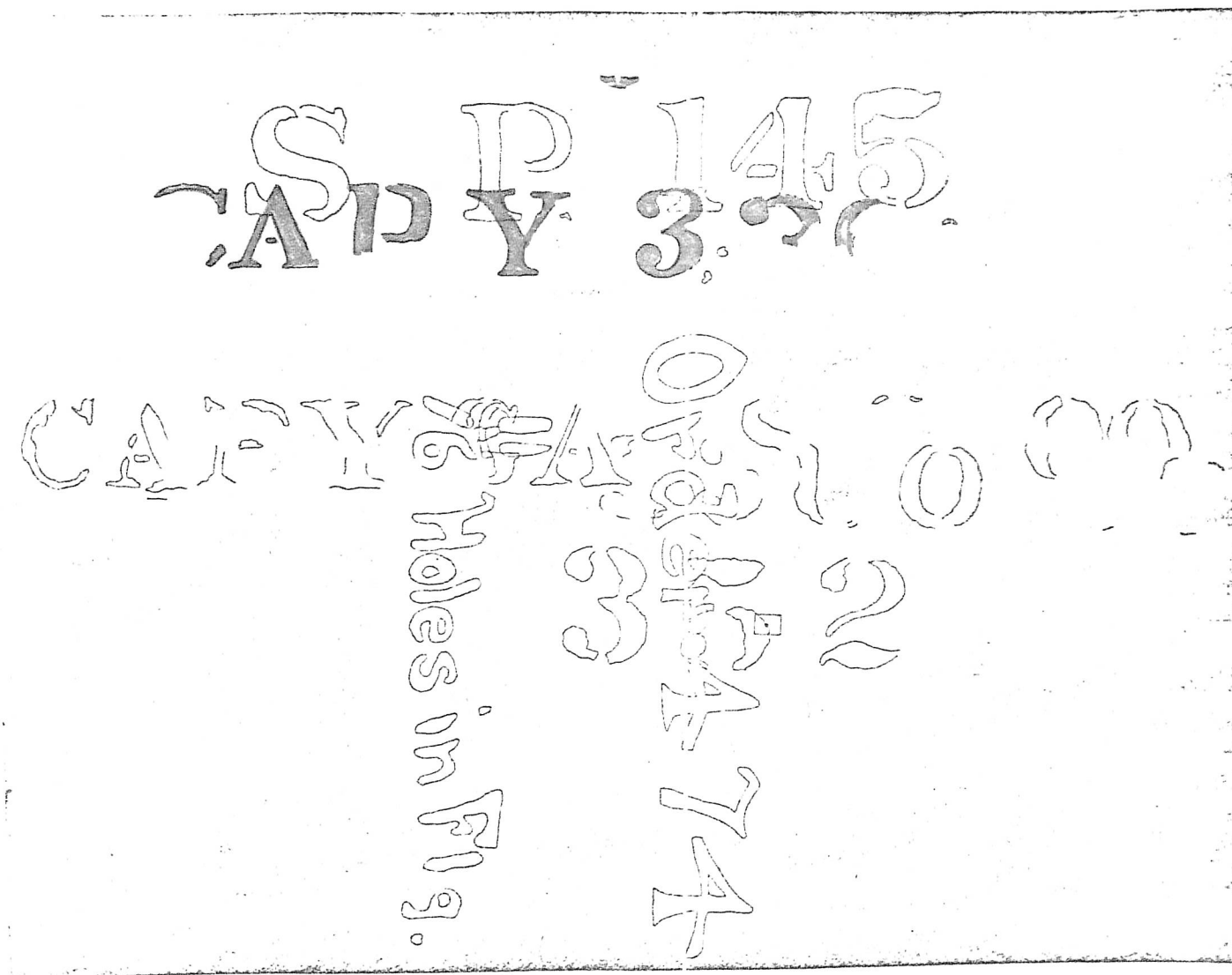


Fig. 8B - Tank: Ends.

"A"

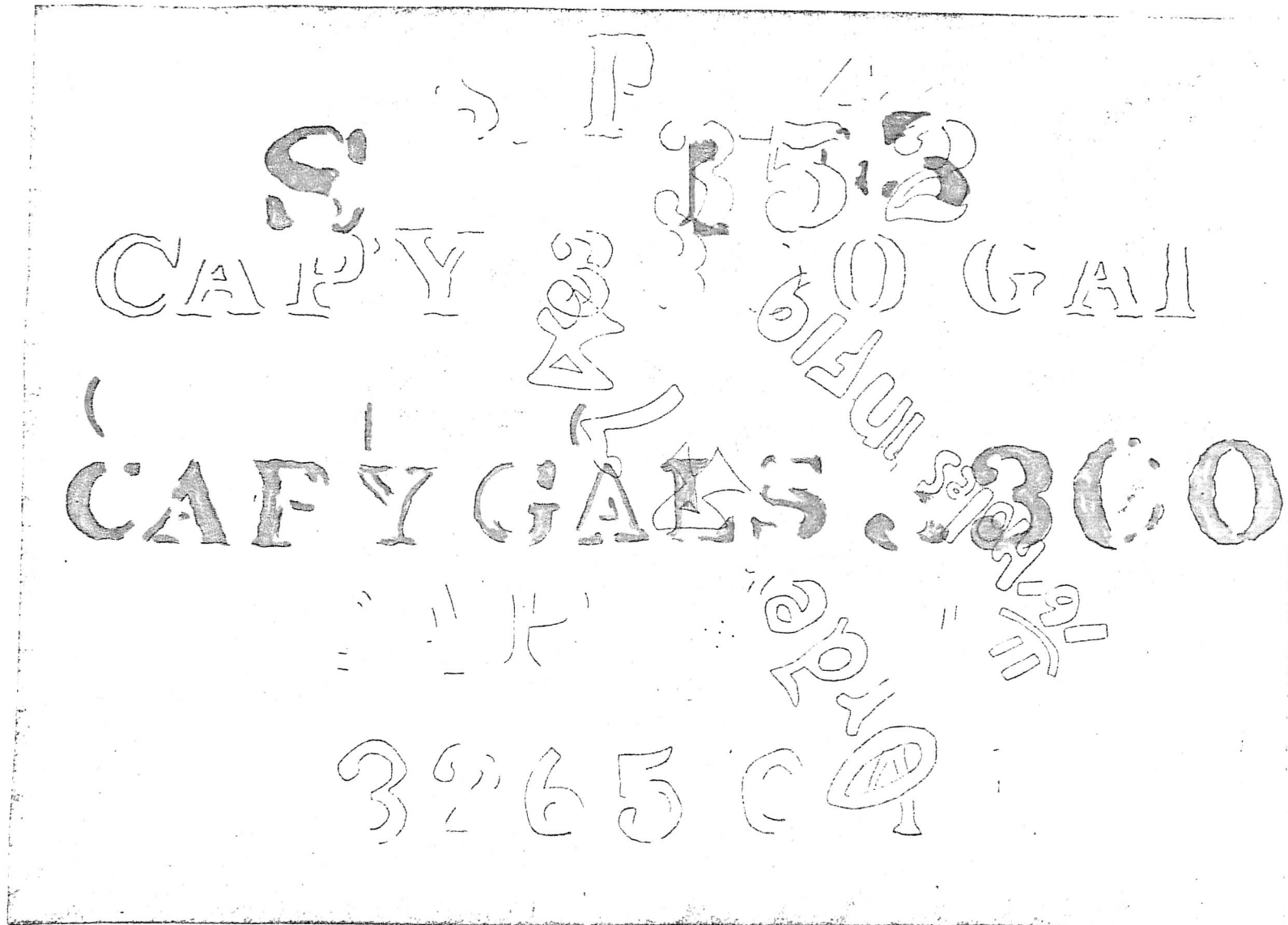


Fig. 9A - Tank: Ends.

"B"

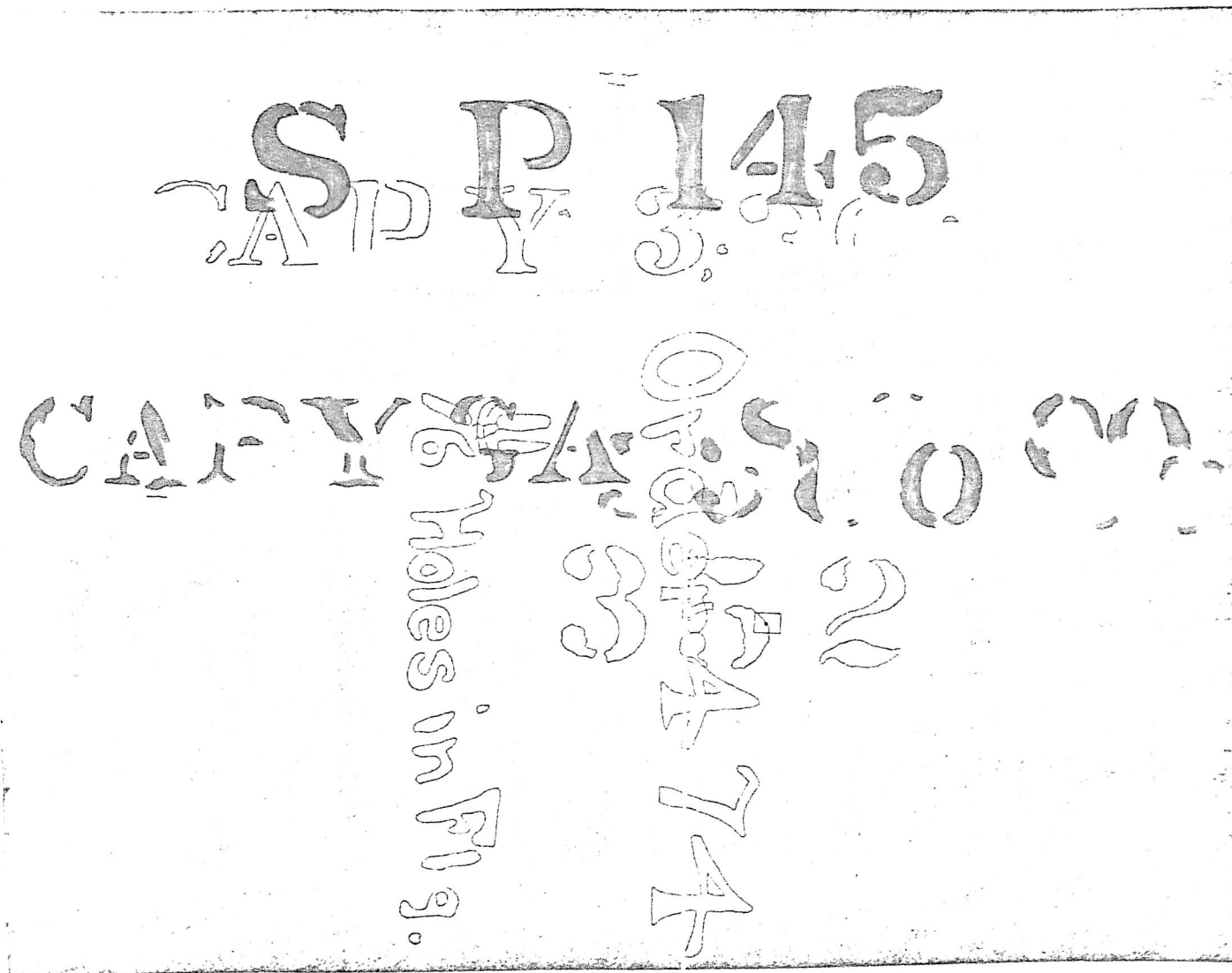


Fig. 9B - Tank: Ends.

"A"

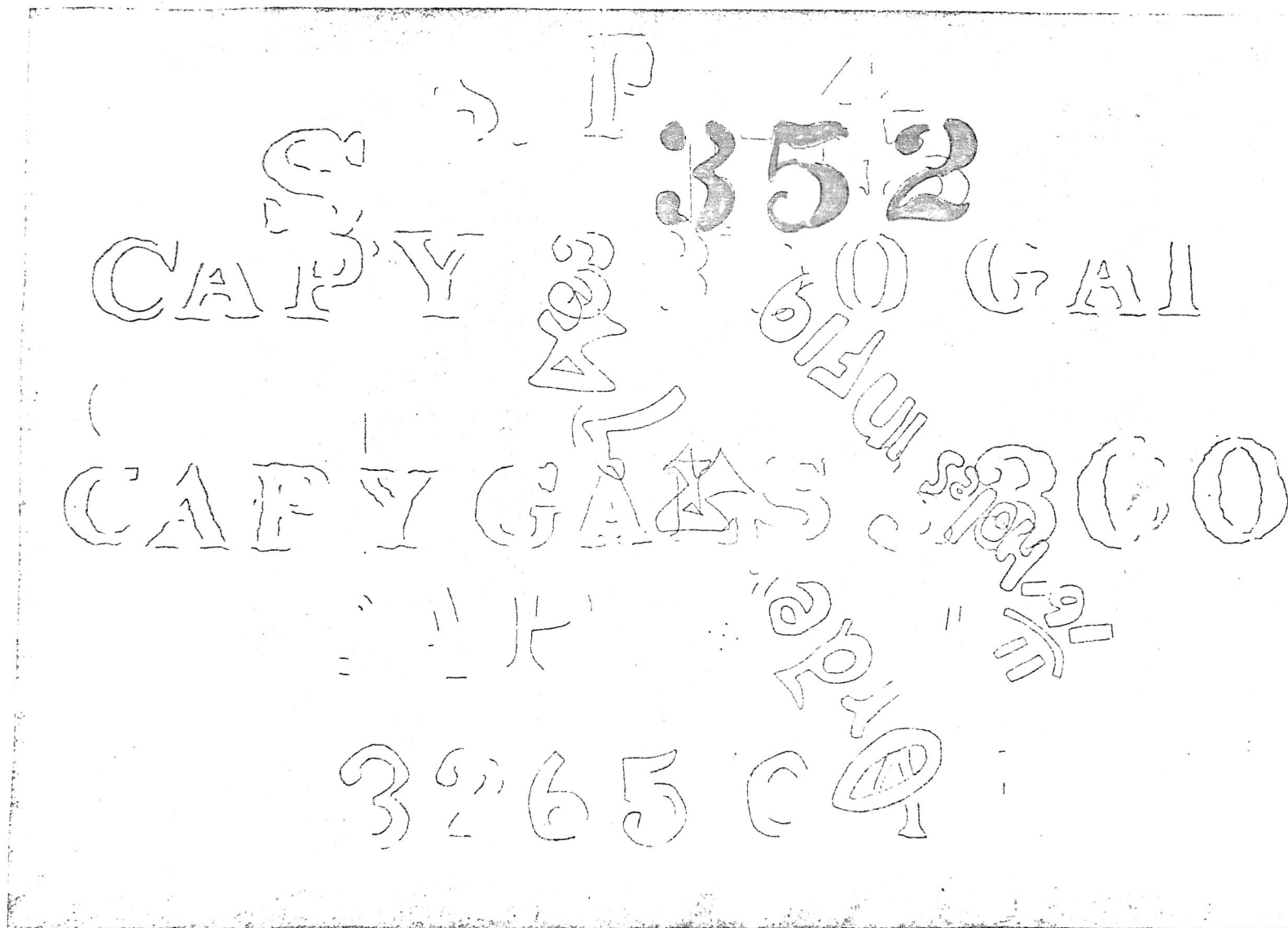


Fig. 10A - Tank: Ends.

"B"

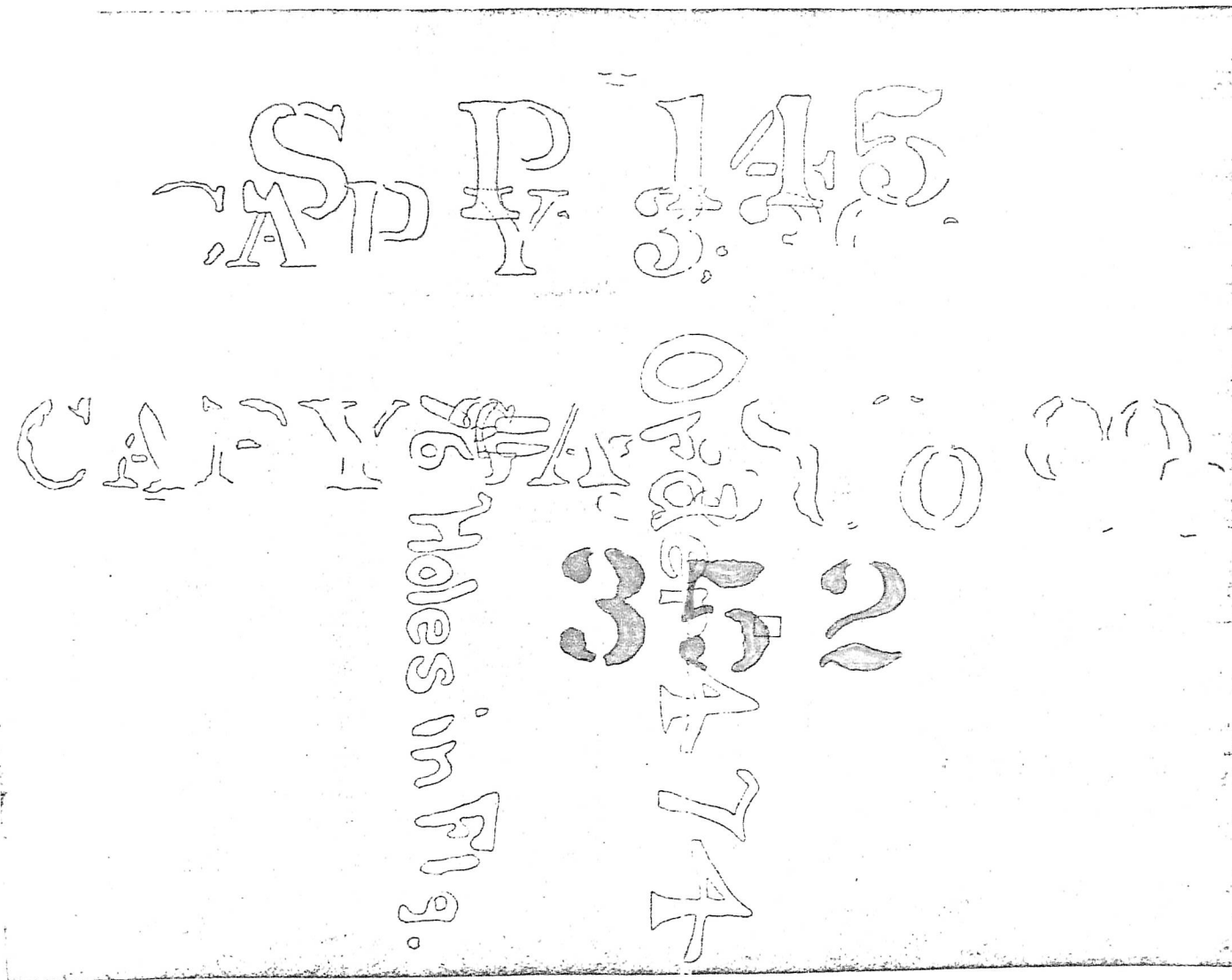


Fig. 10B - Tank: Ends.

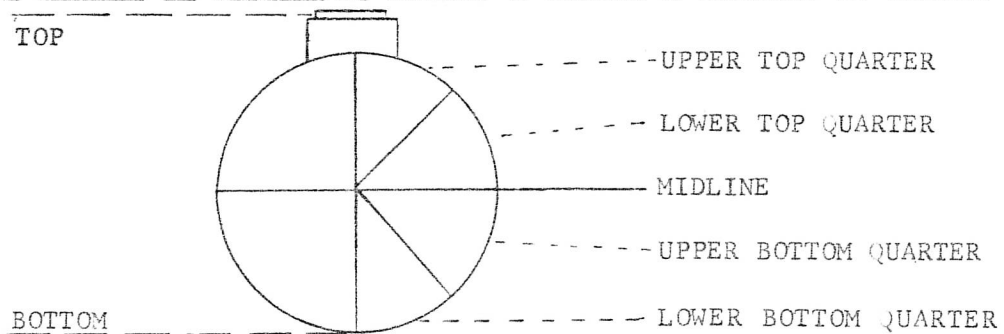
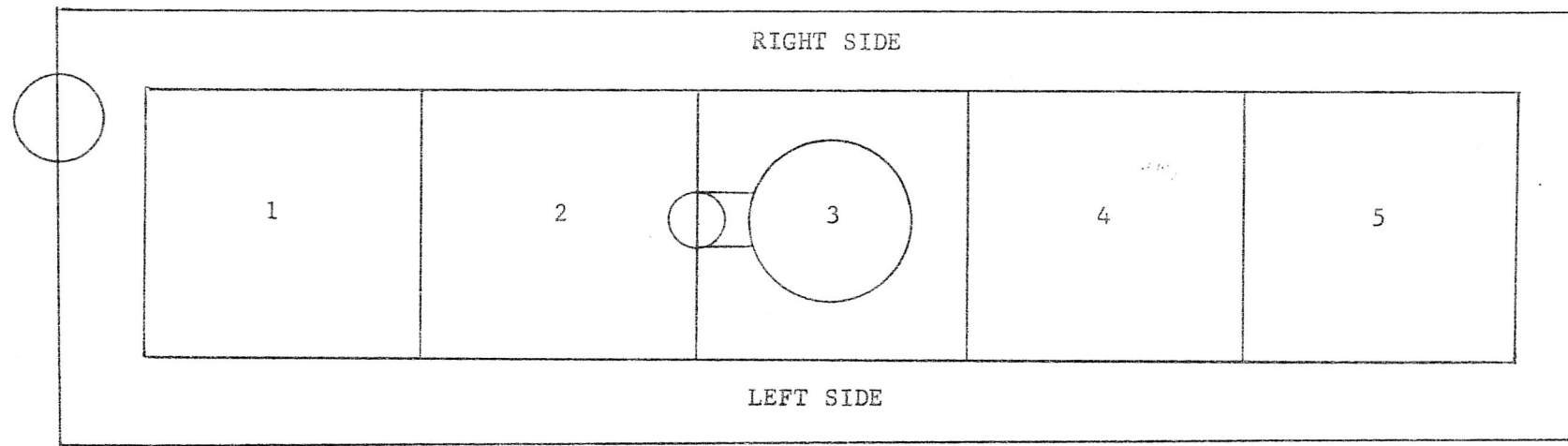
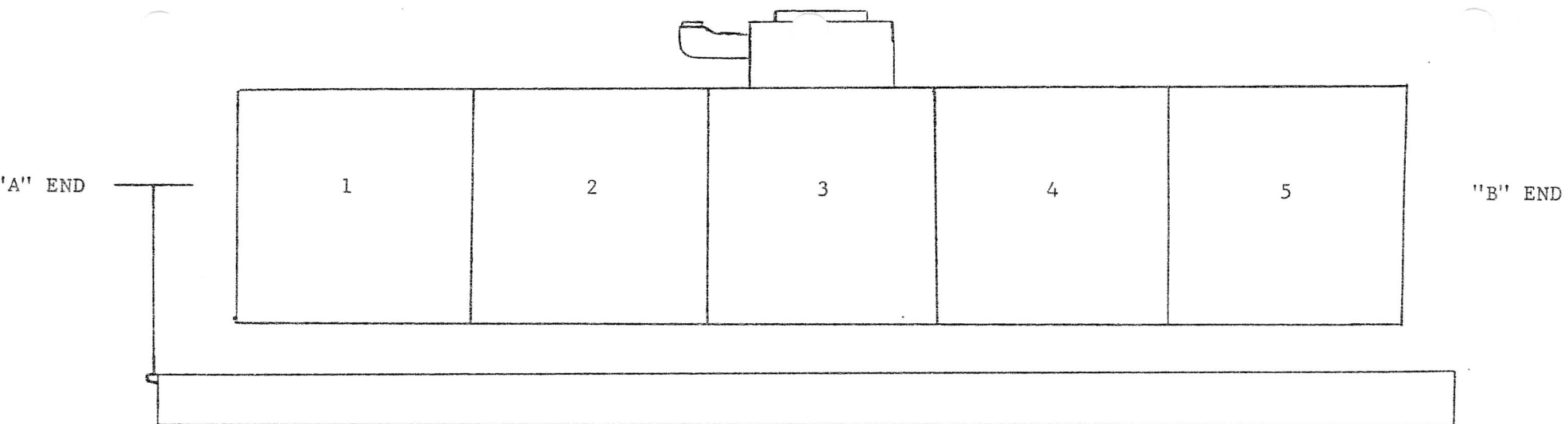


Fig. 11 - Tank: Sides.

Fig. 12 - Tank: L-1/R-5.

S.P. 3145

AP 400

LT WT 19000

26

Fig. 13A - Tank: L-1/R-5.

S.P. 314.5

AP 4(4)

LT WT 18000

26

Fig. 13B - Tank: L-1/R-5.

51-352=
CAP. 20000
KT 19000 26
WU " III

Fig. 14A - Tank: L-1/R-5.

S.P. 315.25

AP_p 4(4)(

LT WT 19000

26

Fig. 14B - Tank: L-1/R-5.

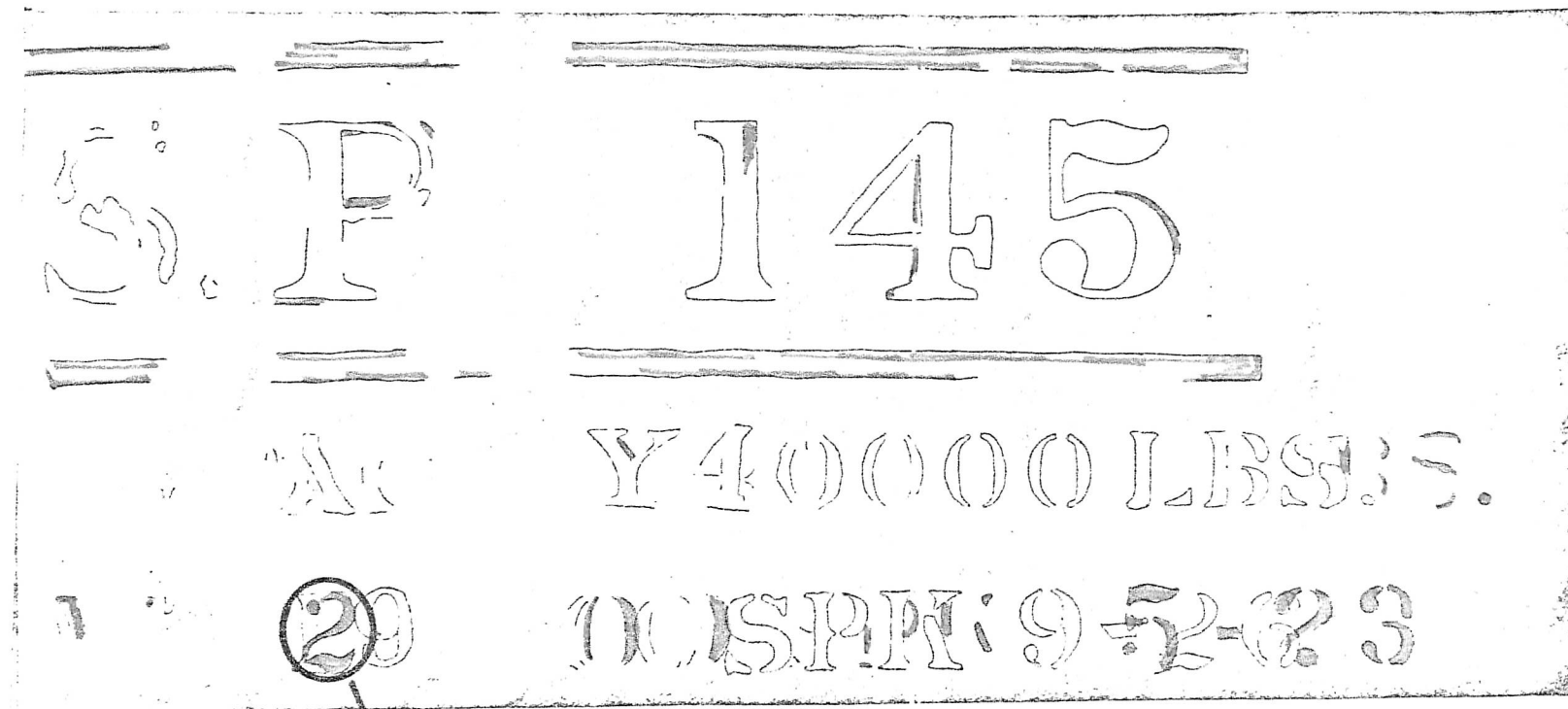


Fig. 15A - Tank: L-2/R-4.

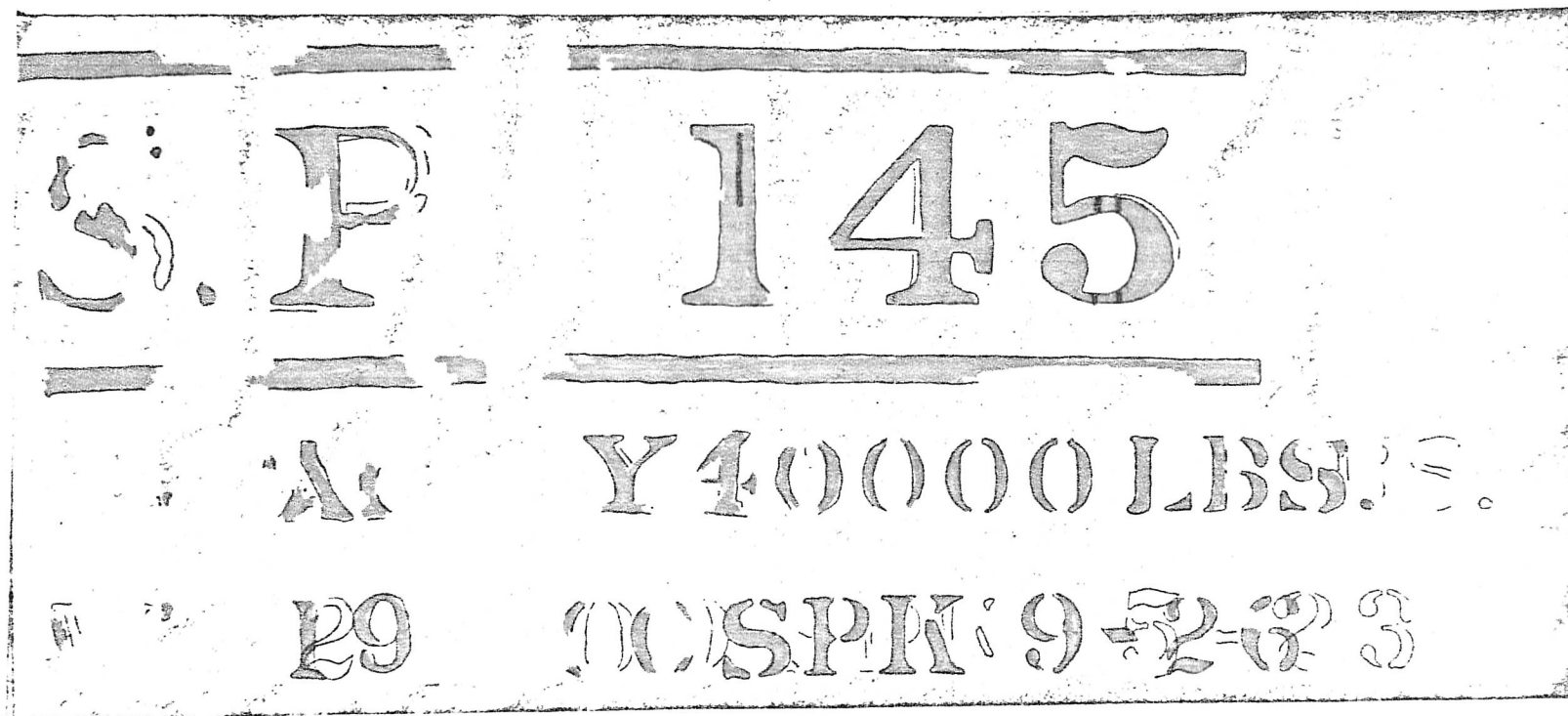


Fig. 15B - Tank: L-2/R-4.

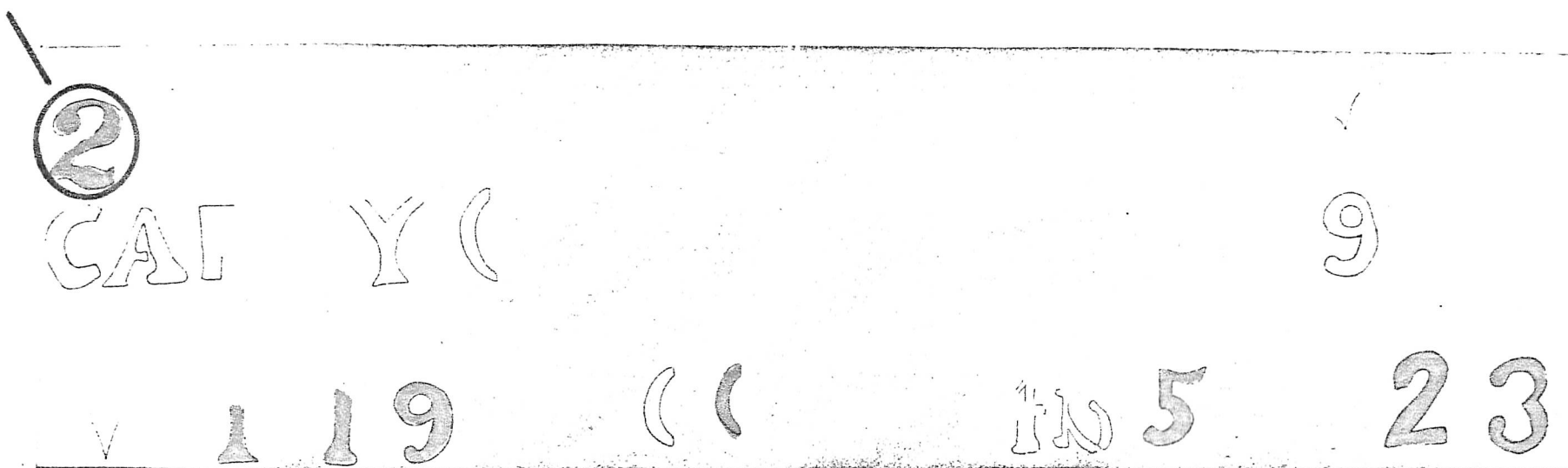
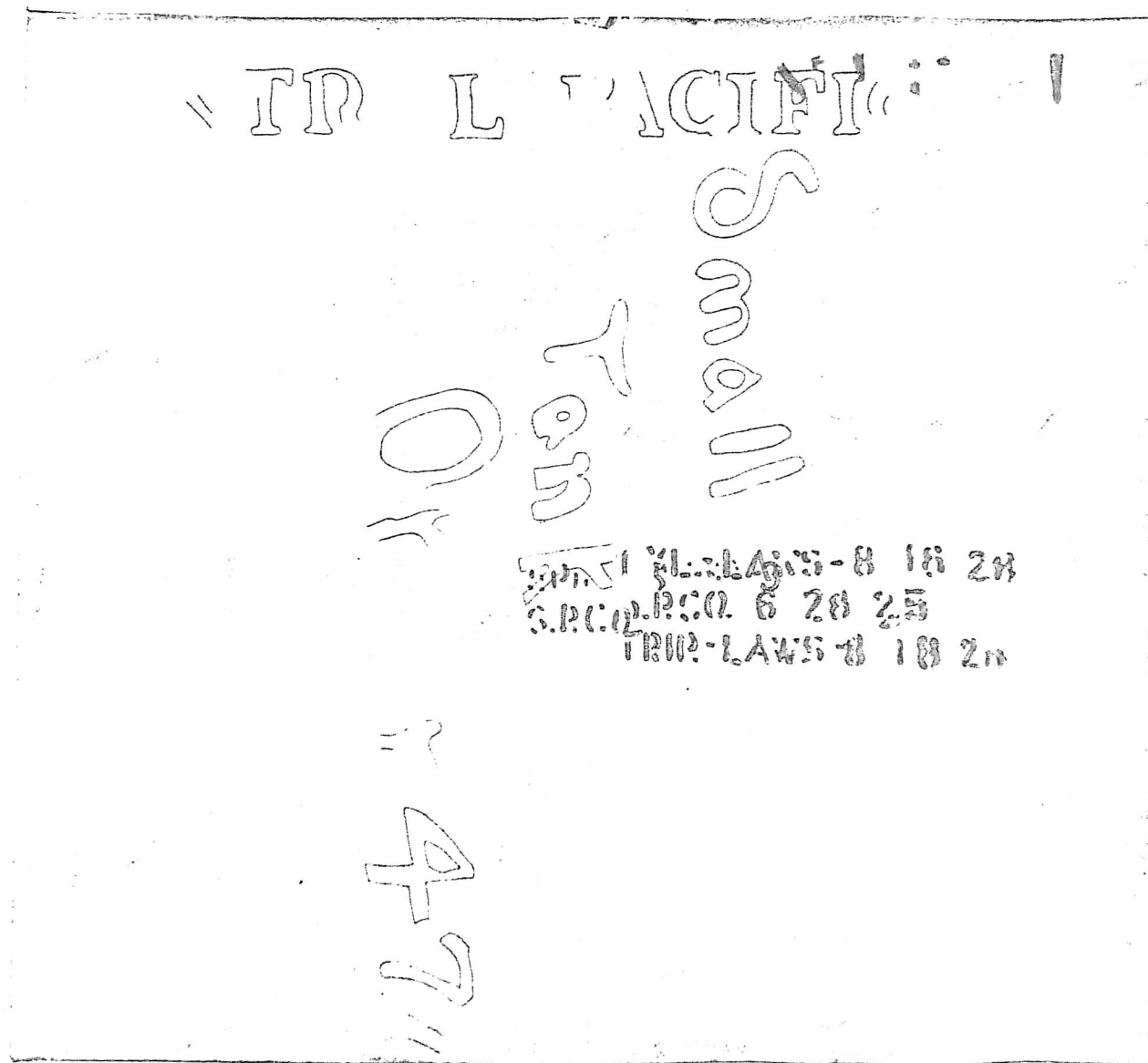


Fig. 16A - Tank: L-2/R-4.

2
CAI Y (9
V 1 1 9 ((1N 5 2 3

Fig. 16B - Tank: L-2/R-4.



UNKNOWN FRAGMENTS

Fig. 17 - Tank: L-4.

Seal
York
Or

FLORIDA - 18 24
S.P.C. 6 24 25
TRIP - LAWS - 18 24

72

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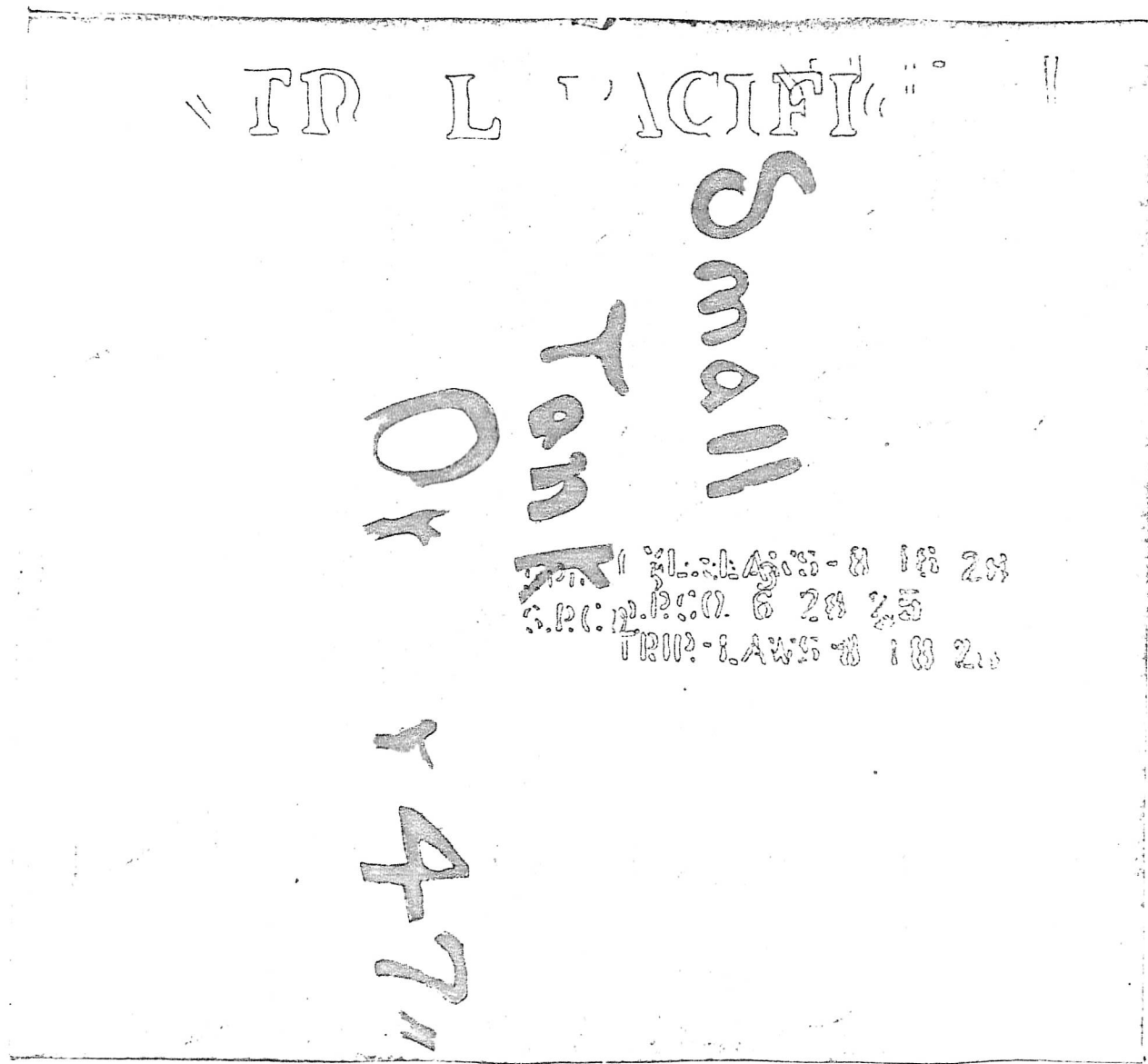


Fig. 19 - Tank: L-4.

7
 RAKE
 21 16 38 56
 PKD
 5 13 39
 4 12 94 17 49
 S.F.

E
 5 TAN - 2
 25 LBS
 TESTED 5 26
 PRESSURE CH
 3 3
 5 23
 T PRESS RE
 BY
 TRIPLE

Fig. 20A - Tank: R-1.

7
 OYO 21 16 38 36
 S.P. 5 13 39
 C.G. 4 12 9 4 17 49
 S.P.

RAKE

E 5 TAN 2
 A 25 LBS 26
 TESTED 5
 RESSURE CH
 3 3
 T 5 23
 PRESS RE
 BY TRIPLE

Fig. 20B - Tank: R-1.

7
RAKE
OYO 2116.38 36
SPKD
OYO 5 13 39
CSE 4 1294 17 49
SE.

E
A
5 TAN 2 - 2
25 LBS
TESTED 5 26
RESSURE CH
3 3
T 5 23
PRESS RE
BY
TRIPLE

Fig. 20C - Tank: R-1.

7
 RAKE
 OYO 21 16.38 56
 S.P. 5 13 39
 OYO 4 12 04 34 17 49
 S.P.

E
 A
 5 TAN - 2
 25 LBS
 TESTED 5 26
 RESSURE CH
 3 3
 5 23
 T PRESS RE
 BY
 TRIPLE

Fig. 20D - Tank: R-1.

7
 RAKE
 OYO 21 16 38 56
 OYO 5 13 39
 OYO 4 12 9 4 17 49
 S.P.

E
 5 TAN - 2
 25 LBS
 TESTED 5 26
 RESSURE CH
 3 3
 T 5 23
 PRESS RE
 BY
 TRIPLE

Fig. 20E - Tank: R-1.

7
 RAKE
 OYO 21 16 38 36
 S.P. 5 13 39
 OYO 4 12 9 4 17 49
 S.P.

E
 5 TAN - 2
 25 LBS
 TESTED 5 26
 RESSURE CH
 3 3
 5 23
 T PRESS RE
 BY TRIPLE

Fig. 20F - Tank: R-1.

7
 EMO
 OYO 21 16 38 36
 S.P.K.D.
 OYO 5 13 39
 C.G. 4 12 94 71 17 49
 S.F.

RAKE

E

A

T

PRESS RE

BY

5 TAN - 2
 25 LBS
 TESTED 5 26
 PRESSURE CH

3 3

5

23

TRIPLE

Fig. 20G - Tank: R-1.

7
 EVO
 OYO 211633856
 S.P.K.D.
 OYO 5 13 39
 OYO 4 1294317 49
 S.P.

RAKE

E
A

5 TAN 2 - 2
 25 LBS
 TESTED 5 26
 RESSURE CH

3 3
 5 23
 T PRESS RE

BY

TRIPLE

Fig. 20H - Tank: R-1.

7
 RAKE
 21 16 38 36
 5 13 39
 4 12 94 34 17 49
 S.F.

E
 A
 T
 PRESS RE
 BY
 5 TAN - 2
 25 LBS
 TESTED 5 26
 PRESSURE CH
 3 3
 5 23
 TRIPLE

Fig. 21A - Tank: R-1.

RAKE
 OYO 21 16.38 56
 S.P. PKD
 OYO 5 13 39
 OYO 4 12 94 74 17 49
 S.P.

E 5 TAN 2
 25 LBS
 TESTED 5 26
 RESSURE CH
 3 3
 5 23
 T PRESS RE
 BY TRIPLE

Fig. 21B - Tank: R-1.

7
 RAKE
 OYO 2116:3856
 SPKD
 OYO 5 13 39
 OYO 4 12943417 49
 S.P.

E
 5 TAN 2
 25 LBS
 TESTED 5 26
 RESSURE CH
 33
 5 23
 T PRESS RE
 BY
 TRIPLE

Fig. 21C - Tank: R-1.

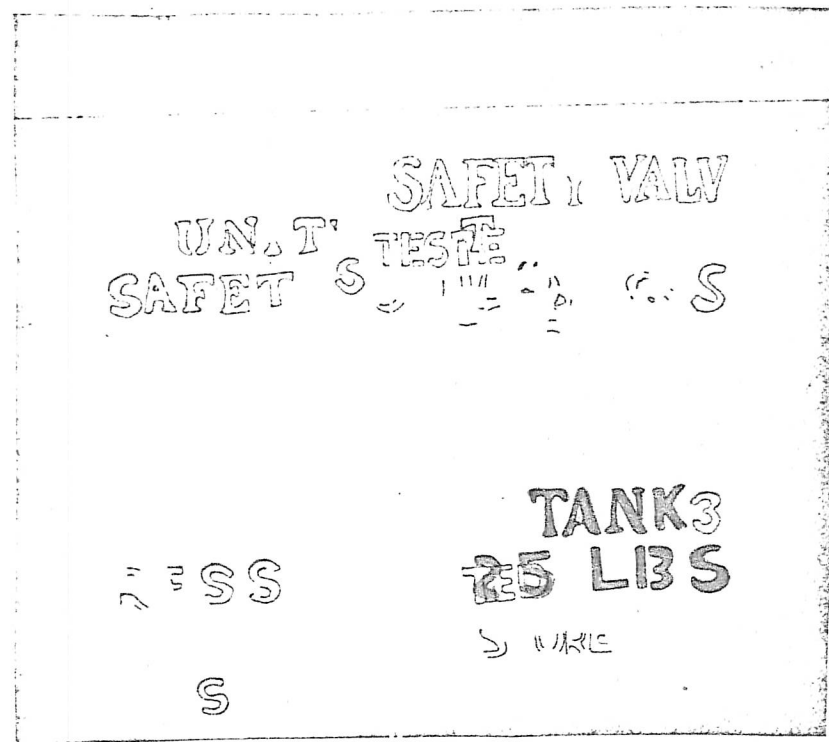


Fig. 22A - Tank: L-5.

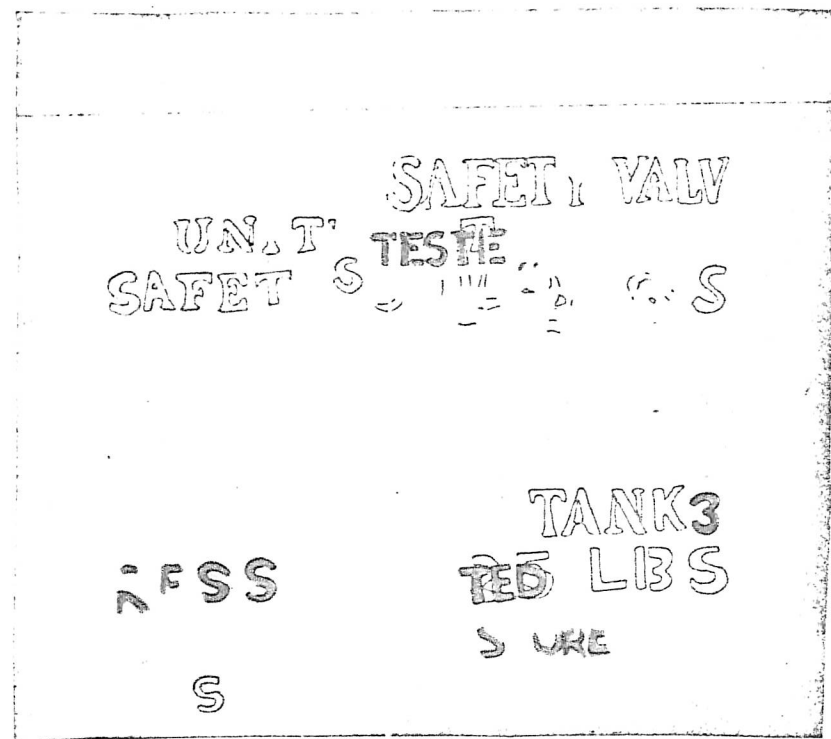


Fig. 22B - Tank: L-5.

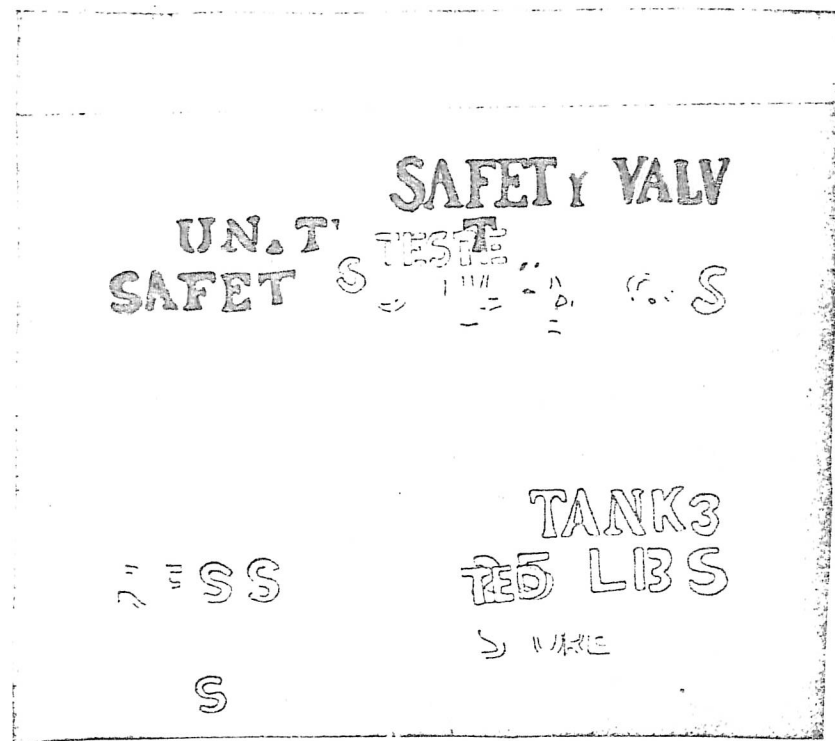


Fig. 22C - Tank: L-5.



Photo #1 In service appearance

GERALD M BEST PHOTO

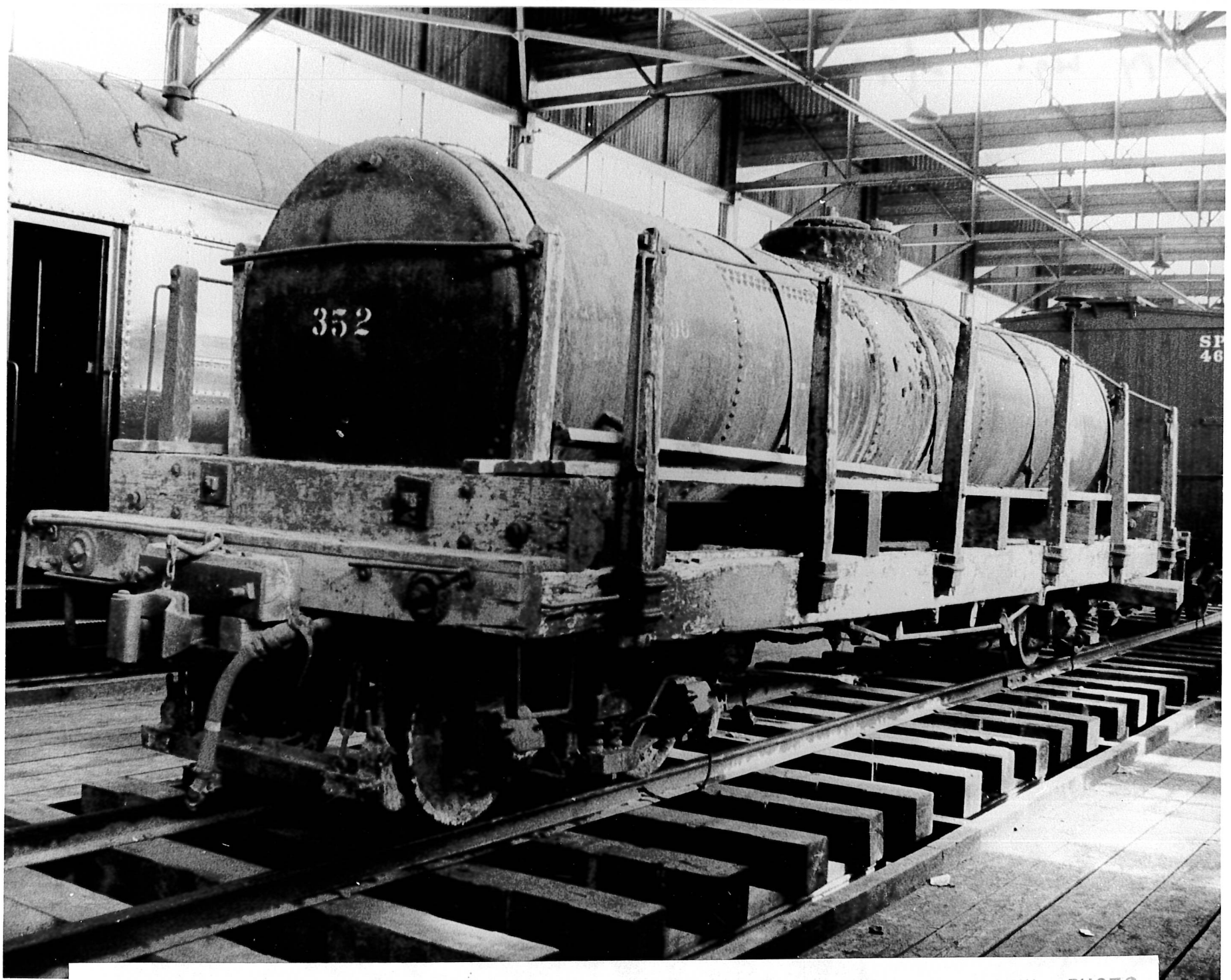


Photo #2 In storage after retirement

STEPHEN E DREW PHOTO



Photo #3 At CSRM Restoration Shop prior to beginning restoration.

CSRM PHOTO

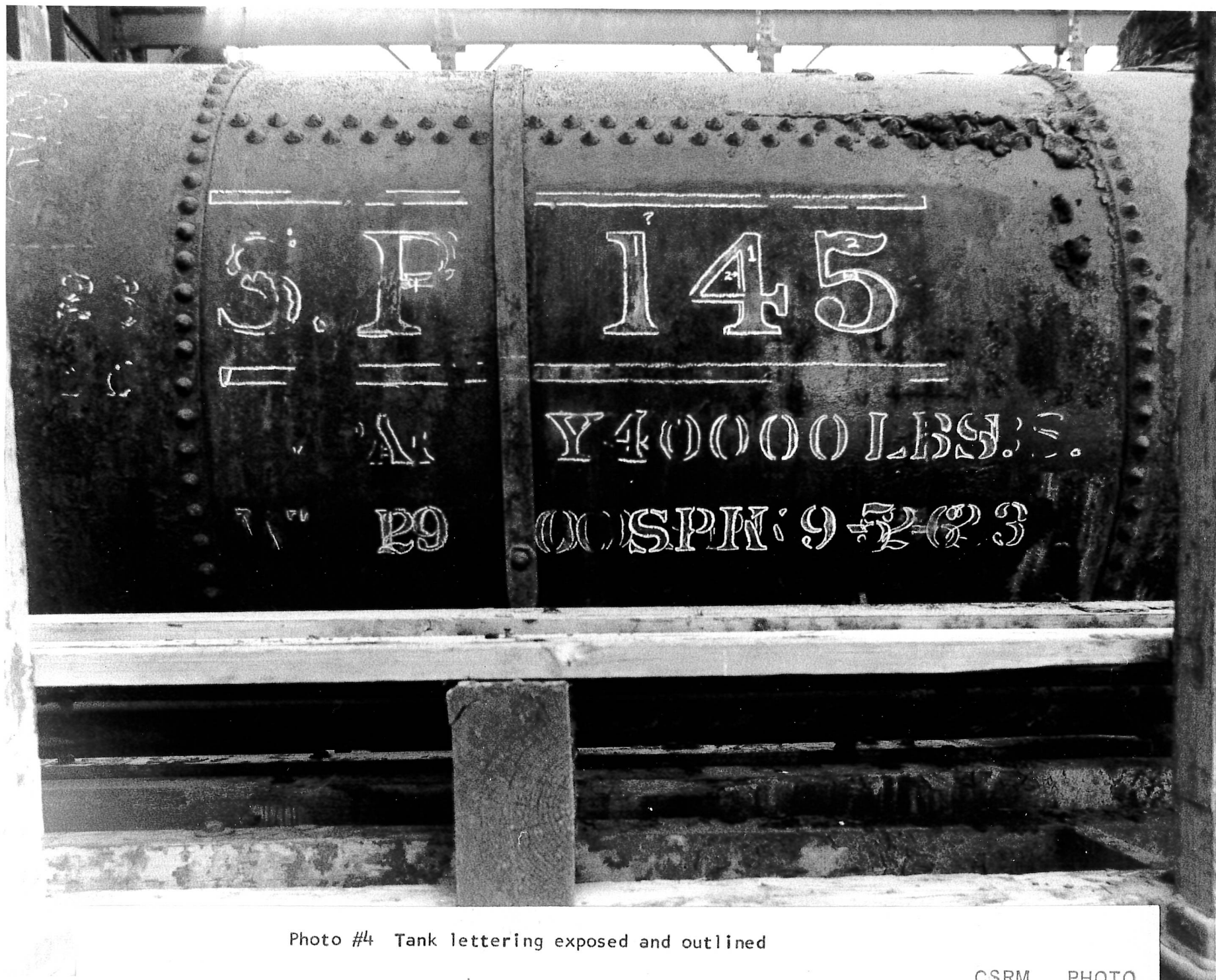


Photo #4 Tank lettering exposed and outlined

CSRM PHOTO



Photo #5 Tank lettering exposed and outlined

CSRM PHOTO

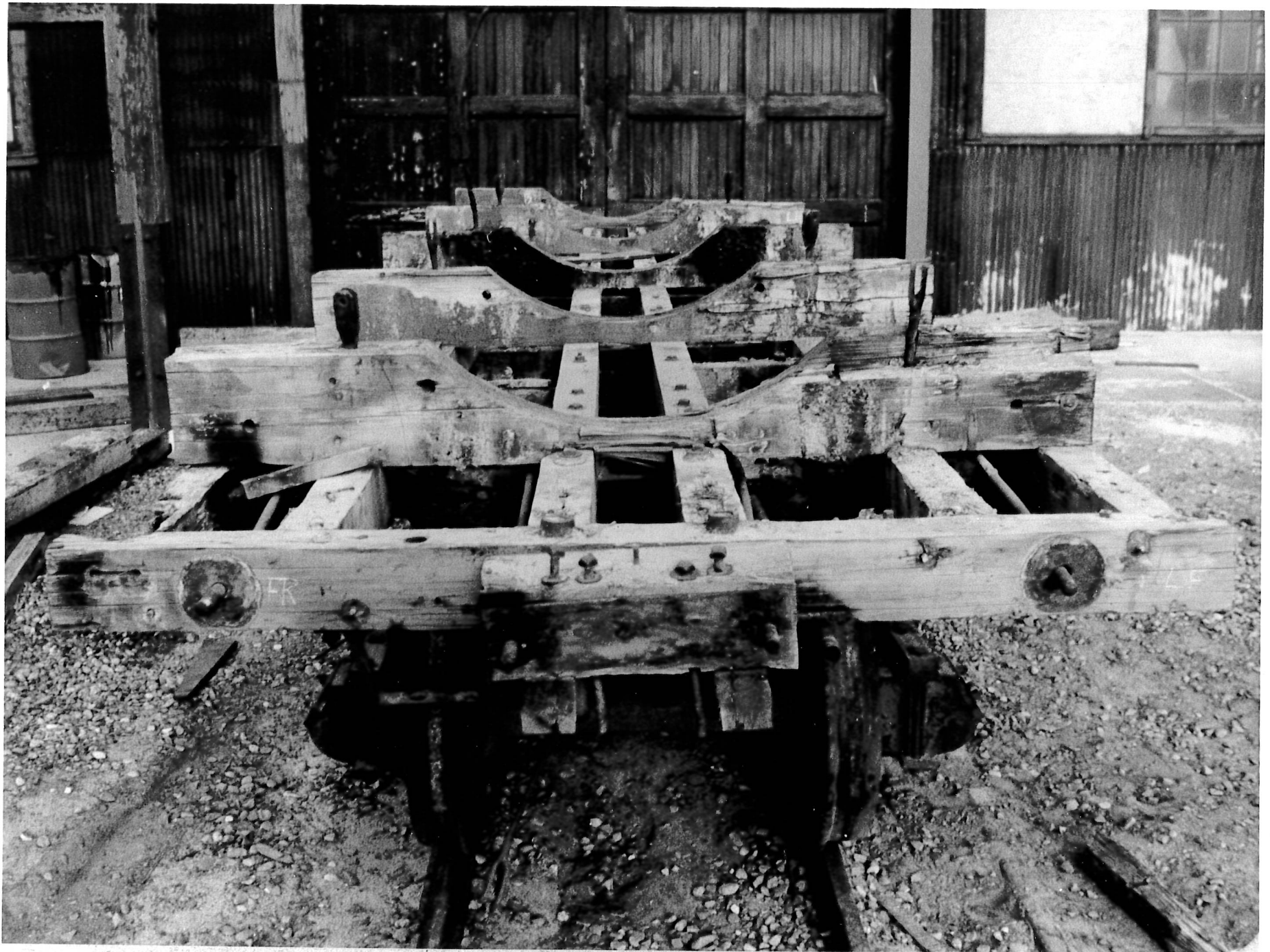


Photo #6 Tank car frame after tank removed

CSRM PHOTO



Photo #8 S.P. #145 following restoration

CSRM PHOTO



Photo #7 S.P. #145 following restoration

CSRM PHOTO